ELECTRICAL REVIEW

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Bibliographies and Abstracts

Compilation a Great Responsibility

"THE bibliography omits many important British publications, including even papers on this very subject read before other scientific bodies. Such omissions as the above in a British paper will be construed, at least by overseas readers, as a positive statement that our engineers and physicists are ignorant and behind the times in these categories . . ." This comment was made in the course of discussion on a paper entitled "Industrial Applications of Electronic Techniques" read before the Institution of Electrical Engineers and now incorporated in the printed *Journal*.

We make no apology for drawing special attention to this criticism because we believe that authors of papers and books have a great responsibility in compiling bibliographies. Unless these can claim to be impartial and reasonably comprehensive, "bibliography" is an inappropriate description and "references" would be better understood.

Readers' Reliance

The reader is entitled to assume that the author of an important work has read and studied widely the existing literature on the subject, so that omissions from a bibliography without any accompanying explanation of its limitations can be seriously misleading.

This occasion may also be taken to remind users and compilers of technical abstracts and indices of the dangers which can arise from insufficient coverage of the field undertaken. Even some well-established abstracting services are often guilty of serious omissions either because copies of certain publications have failed to reach the abstractor or have been overlooked, while some services, particularly some which have grown up during the war, constitute little more than a random selection brought together without system.

Extent of Researches

It would be ideal if all authors would indicate the extent of their research into other published matter, and to name the sources of information which they have not consulted is almost of greater importance than those to which they have referred. Every abstracting service should as far as possible be in a position to provide the user with a complete list of periodicals and books which are covered by the service.

There are some subjects of which the abstractor or compiler of a bibliography must be particularly cautious and no more striking case could be quoted than that of electronics. If a search for material under this magic title is made nothing will be found earlier than the date when America arbitrarily adopted that term to embrace a multitude of subjects of rather indefinite relationship. Again, in the majority of cases where electronic subjects are dealt with in papers and articles, particularly those of British origin, the word "electronics" does not appear in the title. Even in America the popularity of the word seems to be declining since its application became so broad that it ceased to have value as a classification.

Central Authority Appointed

FAIRLY promptly after the placing of the Electricity Act on the Statute Book the constitution of the British Electricity Authority has been made public. As we anticipated at the time of the appointment of the Organizing Committee, this Committee, with the exception of Sir Johnstone Wright, has turned out to be the nucleus of the new Authority. We expressed satisfaction at the time regarding the nature of the appointments and this is strengthened by the additions now announced. Dame Caroline Haslett will be a worthy representative of the consumer —especially the housewife; Alderman Sir William Walker has earned the gratitude of the workers in the industry for his activities on their behalf, apart from his technical and administrative abilities; Alderman W. S. Lewis has long experience of the industry as an E.T.U. official and has also a sound civic background; Mr. J. S. Pickles brings to the Authority intimate knowledge of electricity supply—particularly in rural areas; and Mr. H. J. Randall as manager of one of the London companies will be the spokesman for the important Metropolitan area. The last three, with Mr. J. Eccles, are to be the first chairmen of Area Boards to take a turn on the Authority.

"Equality of Sacrifice"

INDUSTRIALISTS will be justly aggrieved if, while they are being called upon to make substantial cuts in their electrical demands at considerable inconvenience and expense, other consumers are allowed to make unrestricted use of electrical service. As was pointed out at a press conference last Friday, industrial and non-industrial electricity demands are approximately equal so that a one-third reduction in the industrial load is only a sixth of the total, even if it is fully achieved. It has been accepted that actual rationing of electricity to domestic and commercial consumers is impracticable, but in two or three weeks' time it is intended to produce a scheme by which these consumers may make their contribution to the relief of our overburdened electricity supply system. At the conference, Sir John Kennedy mentioned that generating plant was being augmented at the rate of 800,000 to 900,000 kW a year and that there should be sufficient to meet all requirements in three or four years' time. It is to be hoped that the steps now being taken will improve upon this but with all the electrical manufacturing industry's diverse commitments the hope is a slender one.

Dollars and Exports

IT is suggested that the strict limitation placed upon the convertibility of sterling into dollars will have the effect of curtailing supplies to Great Britain. That may be so but countries anxious to dispose of their surpluses and unable to find markets in the "hard currency" countries will no doubt be persuaded to accept sterling payments or goods from this country. They will prefer badly-needed goods and on the face of things this should tend to make them hesitate to impose or maintain restrictions upon imports of British products. The danger arises of curtailment of essential raw material supplies. By some means or other the Government will have to guard against this possibility which would seriously effect the electrical manufacturing industry, among others, and prevent that expansion of export trade which is imperative.

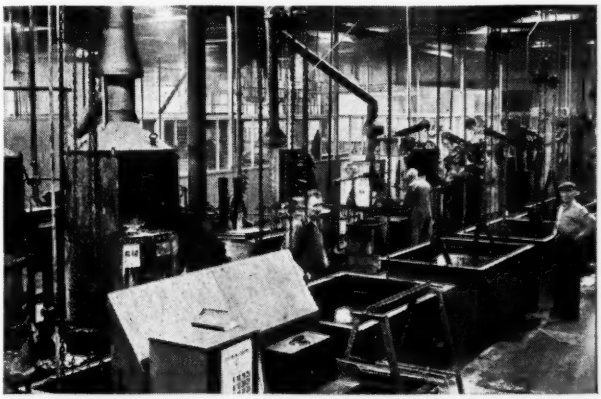
Generators from South Africa

NEWS of the placing in South Africa of a contract for 20,000 kVA of generating plant to assist in maintaining production in Great Britain during the anticipated fuel cuts next winter comes as a shock almost if not quite as great as that of the country's having to import coal. The situation is still the more remarkable owing to the fact that South Africa has for many years, and for that matter still is, one of the largest overseas buyers of British generating plant. While the tendency for the Dominions to make themselves more self-supporting in the matter of the supply of generating plant is likely to continue, the present position is highly exceptional and brought about solely by the shortage of generating capacity due to this country's wartime pre-occupations. When the present difficulties have been overcome there seems no reason to doubt that there will still be a large demand for British generating equipment in South Africa, particularly for the larger sets. None of the units ordered from South Africa is of larger capacity than 100 kVA.

Precision Heat Treatment

Processes Applied to Aero-Engine Components

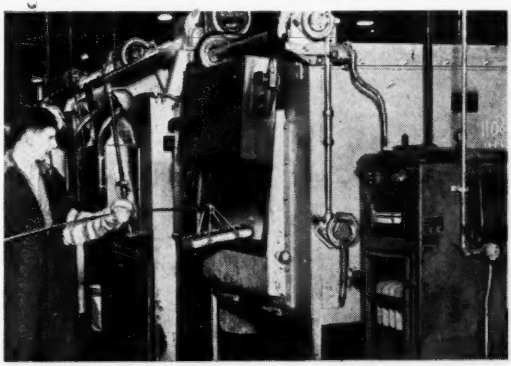
DURING a recent visit to the heat-treatment department of the Glasgow aero-engine works of Rolls-Royce, Ltd., we saw the various heat-treatment processes of normalizing, hardening and tempering, carburizing, nitriding, high-speed tool hardening and spring hardening applied to many components by means of a comprehensive installation of electric furnaces. Such components as gear-wheel forgings and cylinder-liner forgings, indeed, all forgings weighing over one pound, require to be normalized, to relieve the stresses created in them during the forging processes. Larger components, such as propeller shafts, cylinder liners and reduction-gear units are dealt with by 150-kW "Efco" or "Birlec" resistance furnaces in which they are treated at temperatures from 860 to 930 deg C, for periods of from two to four hours, according to the quantity charged.



Various heat treatments are applied to many aero-engine parts by a comprehensive installation of electric furnaces

For certain types of steel, softening is also carried out after the normalizing to facilitate machining. This subsequent operation is effected at temperatures from 650 to 670 deg C, for periods of from three to six hours, in furnaces of the same type as those devoted to normalizing. A typical example of the 150-kW furnaces in which normalizing is carried out is one which has a temperature range up to 1,000 deg C. The hearth is 7 ft 6 in. long, 4 ft 8 in. wide and 1 ft 6 in. high and is capable of taking charges weighing up to three tons. The elements are disposed under the hearth, on the inside of the door, and on the walls and roof of the heating chamber, and are arranged in one group for both supply and control purposes.

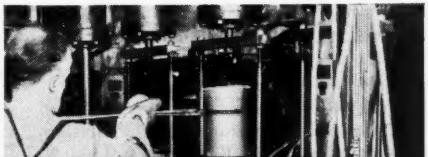
The automatic control system, which is similar to those of all the other furnaces to be described, and in this case has Foster instruments, has a pyrometer thermocouple projected into the heating chamber, which is connected to a motorized presetting pyrometer instrument on the remote control board. This instrument, in turn, actuates Brookhirst contactor gear governing the supply to the elements which is at the works distribution system voltage of 400. Most of the furnaces employed for long-period treatment are equipped with additional

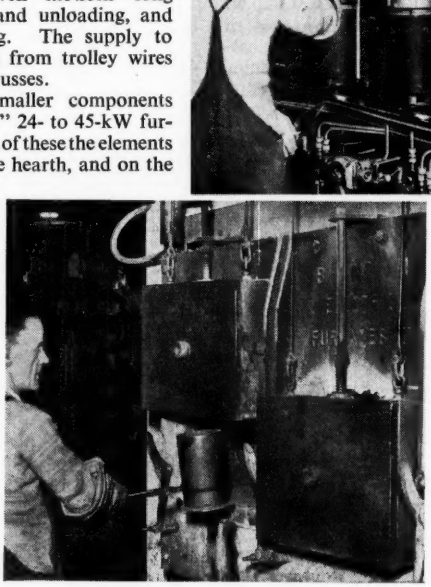


For normalizing smaller components 24- to 45-kW hand-loaded furnaces are used

recording pyrometers which permit precise time-temperature control over the charges. The 150-kW normalizing furnace in question is aligned with a number which are all served by a " Birlec " electrically operated charging machine with three separately motor-driven motions—long travel, ram loading and unloading, and raising and lowering. The supply to the charger is taken from trolley wires slung from the roof trusses.

For normalizing smaller components " Efco " and " Birlec " 24- to 45-kW furnaces are used. In each of these the elements are arranged under the hearth, and on the sides and roof of the chamber and, in the larger sizes, also on the door. They are supplied in one bank at 400 V direct. The conditions of treatment are similar to those relating to the larger components and furnaces, except that shorter treatment periods are required and loading and unloading are done by hand.





Oil hardening of liners, etc., and case hardening of gears are effected in a rotary-hearth furnace; unloading liner

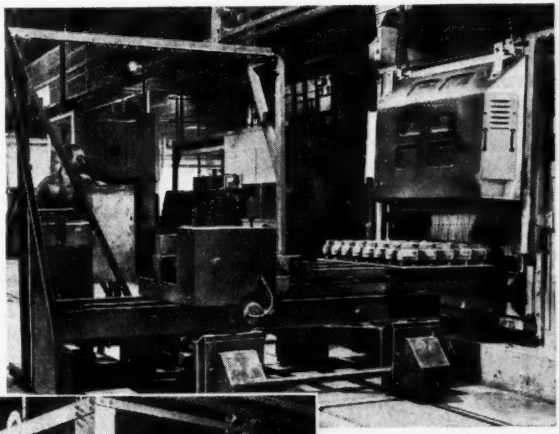
To eliminate distortion die-quenching is employed

A variety of parts to various specifications are hardened and tempered. Hardening involves heating the steel to slightly above its upper critical temperature and cooling in air, oil or water, the actual temperature and cooling being determined by specification. Tempering is a subsequent operation to hardening and involves heating again to some temperature, below lower critical, dependent on properties required in the actual part. Besides relieving the stresses set up in hardening it reduces hardness and thereby considerably increases toughness. There is a notable division in steels as regards hardening, that is, oil or direct hardening steels compared with case hardening steels. Typical examples of components made from oil hardening steels are connecting rods, cylinder liners, studs and bolts, and of components made from case hardening steels are all major gears, thrust housing and tappets.

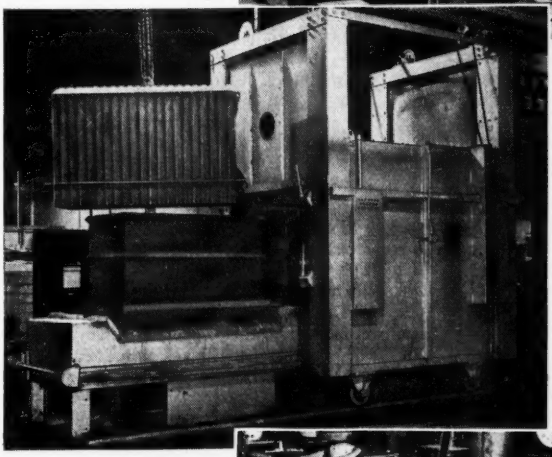
Such components as case-hardened gears are tempered at the lower end of the temperature range in air-circulation furnaces

In case hardening it is necessary to carburize the metal in order to enrich the surface with carbon, whereas in oil or

direct hardening there is sufficient carbon in the steel to impart the required hardness values. The process employed is dictated by the type of steel of which the components are made. The 24- to 45-kW furnaces employed for normalizing are also used for this process, as is also a 110-kW rotary-hearth furnace. In this furnace the 9-ft mean diameter hearth is revolved by a 3-h.p. motor by way of a worm-redution trans-

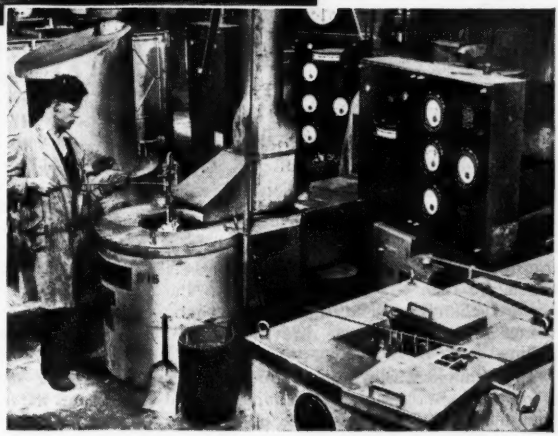


The 150-kW furnaces for carburizing and normalizing are served by a travelling charger



Above: Nitriding involves impregnating the outer layers with nitrogen during heating

Right: High-speed tool hardening is carried out in a three-unit salt-bath installation

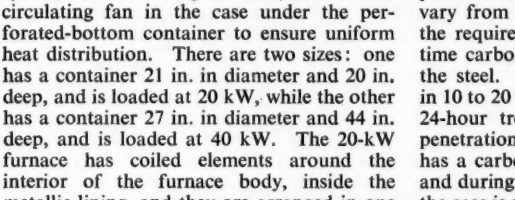


mission system which results in a maximum hearth speed of one revolution in 16 minutes; the speed can be slowed down to one revolution in 1½ hours by means of a quadrant gear. The timing is pre-set according to the type and quantity of the charge. Both loading and unloading are done by hand, and the components are placed in various types of trays and stands which ensure the maximum rate of quench and reduce distortion to the minimum.

The temperatures employed for hardening vary from 720 to 960 deg C, while those for tempering vary from 130 to 700 deg C. The heating time depends on the mass of the charge

and varies from 15 min to 1½ hours. A non-oxidizing gas atmosphere in the rotary-hearth furnace permits bright scale-free heat treatment of practically finished components. The atmosphere is provided by partly-burnt town gas obtained from a "Birlec" atmosphere gas plant. The elements are arranged in two separately controlled zones, and the maximum temperature is 1,000 deg C. The temperature is automatically maintained by a Kent system similar in principle to that already described, but in this case the two contactors, one for each zone, serve two transformers from which the elements are supplied at 116 V.

Such components as case-hardened gears require tempering at the lower end of the temperature range—usually at about 160 deg C— and for this work there are two vertical-cylinder air-circulating furnaces, each with a circulating fan in the case under the perforated-bottom container to ensure uniform heat distribution. There are two sizes: one has a container 21 in. in diameter and 20 in. deep, and is loaded at 20 kW, while the other has a container 27 in. in diameter and 44 in. deep, and is loaded at 40 kW. The 20-kW furnace has coiled elements around the interior of the furnace body, inside the metallic lining, and they are arranged in one bank which is supplied direct at 400 V. The 40-kW furnace is similarly constructed, except that the elements are of the rod type and are fed at only 40 V from a suitable transformer. The work is loaded into baskets which are then lowered by crane into the heating chamber. The top furnace door swings round and is very heavy to ensure sealing.



Special tilting-head furnaces have been developed for treating engine valve springs at 900 deg C

To eliminate distortion die-quenching is employed, and a notable example of the equipment used for this operation is one built by the Rolls-Royce engineers for dealing with cylinder liners. It consists of hydraulically operated collets which hold the liners in position under pressure during quenching. The actual immersion and withdrawal of the dies and liners into and from the quench tank are effected by pneumatic rams. Gleason hydraulic presses are also employed for maintaining the dimensions of thin section gears during hardening.

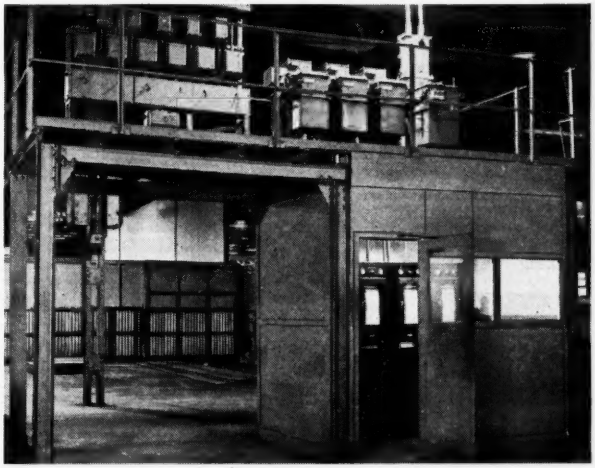
Components whose surfaces are subjected to wear, e.g., gear wheels, race housings and tappet heads, are carburized. This involves packing the components in a carbonaceous compound in boxes made of nichrome steel which enables them to stand up to the successive heatings, then raising the complete load up to temperatures of 880 to 930 deg C, and allowing them to remain at this temperature for a length of time which may vary from three to 24 hours, dependent on the required depth of the case, during which time carbon is absorbed into the surface of the steel. The three-hour treatment results in 10 to 20 "thous" depths of case, while the 24-hour treatment affords 70 to 80 thous penetration. The steel used for carburizing has a carbon content of under 0·2 per cent, and during carburizing the carbon content of the case is raised to from 0·85 to 1·0 per cent. The 150-kW furnaces employed for normalizing are also used for carburizing.

The carburizing boxes are packed and unpacked on a special conveyor system. The boxes unloaded from the furnace are taken from the charger and placed on a transporter bogie by which they are carried to the conveyor system on which they travel very slowly in order to allow them to cool before reaching the discharge end of the conveyor system. Here they are emptied on to a grid through which the compound falls on to a secondary conveyor system which passes the material through a washing plant and back to the filling hopper which serves the primary conveyor system at the loading end.

Nitriding is a low-temperature hardening process which involves impregnating the outer layers or skin of the work with nitrogen, thus producing a case of extreme hardness which eliminates the need for any further treatment. Crankshafts in particular are treated in this

way, and the operation is carried out by heating the components at the finished machine state in an atmosphere of ammonia gas at a temperature of 470 to 490 deg C. Here again the time ranges from 10 to 80 hours. The treatment is carried out in a "Birlec" 55-kW double-container type of furnace with a sliding chamber. While one half of the hearth and its container are inside the heating chamber during treatment the other half is outside and is loaded and unloaded.

The heating chamber runs on rails and the double hearth is a fixture, i.e., the body moves over the hearth and a lift-up balance-weighted door on each side of the chamber facilitates this operation. The container is about 4 ft 6 in. long, 2 ft 6 in. wide and 2 ft 6 in. deep, and it accommodates up to nine crankshafts which are placed in a tiered frame with V resting notches. Each container is placed on its respective half of the hearth and it is covered by an inverted "bell" which is sealed at the bottom. Ordinary resistor elements are fitted on the insides of the walls and roof of the heating chamber, and all the connecting leads are carried in metallic flexible conduit. The elements are arranged in a single bank and are supplied at 220 V from a contactor-controlled transformer, and Cambridge pyrometer equipment is employed.



In all furnaces the pyrometer couples are connected to motorized pre-setting dual-pointer instruments on the remove control board; carburizing furnaces control house and control board (note distribution equipment surmounting control house)

High-speed tool hardening is carried out in a "Birlec" installation comprising an electrode-type pre-heating salt bath, a high-speed electrode salt bath and a metallic-resistor type salt bath. The high-speed tools so treated are mainly 18/22 per cent tungsten tools, such as milling cutters, drills and reamers. The tools are pre-heated in the first bath to temperatures varying from 800 to 850 deg C, then transferred to the second bath for treatment at from 1,250 to 1,300 deg C, and finally tempered in the third bath at from 540 to 600 deg C. Time and temperature are closely controlled in all the baths. The respective loadings of the three baths are 40 kVA, 40 kVA and 25 kW. The baths are supplied at low voltage and the transformer for the high-temperature salt bath has a tap-change switch, for heat control.

For the hardening of engine valve springs, which are made of chromium-vanadium wire and require treatment at 900 deg C, there are specially developed tilting-head furnaces. In each of these the rectangular head or body is carried by projecting end shafts which are supported by bearings on a frame surmounting the quenching tank. The body carries six heating tubes into which the springs are plunger loaded and on the outside of which the heating elements are wound. When the hardening temperature has been obtained the head is tilted and the springs fall out into the quenching tank. After hardening, the springs go for tempering at 430 deg C to a furnace similar to the air-circulation furnaces employed for ordinary tempering.

We are indebted to Rolls-Royce, Ltd., for permission to visit the factory and to publish this article, and to Mr. William Douglas, electrical engineer, and Mr. W. Kerr and Mr. I. Crawford, superintendent and assistant superintendent, Heat-Treatment Department, for their help.

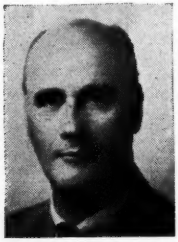
British Electricity Authority

Announcement of First Appointments

LAST week the Minister of Fuel and Power announced the constitution of the British Electricity Authority under the new Electricity Act. The chairman, **Lord Citrine,** C.B.E., was appointed in May last in anticipation of the passing of the Bill, and a sketch of his career was published in the *Electrical Review* of July 18th.

Lord Citrine, chairman

Sir Henry Self and **Mr. J. Hacking** have been appointed deputy chairmen. Sir Henry Self has been a civil servant since 1907 and is at present Permanent Secretary of the Ministry of Civil Aviation. Mr. Hacking has been chief engineer to the Central Electricity Board since 1944 having been appointed deputy chief engineer in 1934.



Sir Henry Self and Mr. J. Hacking (right), deputy-chairmen

The following become members of the Central Authority :—

Dame Caroline Haslett, director and secretary of the Electrical Association for Women, adviser to the Minister of Labour on women's training, and a member of many diverse committees.

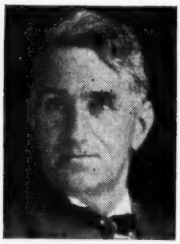
(Left) Dame Caroline Haslett and (above) Lt.-Col. Woodward

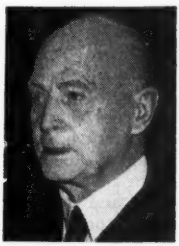
She was created a Dame Commander of the Order of the British Empire in this year's King's Birthday Honours.

Mr. E. W. Bussey, C.B.E., who has been general secretary of the Electrical Trades Union since 1941 and was previously a substation engineer in connection with the London passenger transport system for a period of about thirty years.

Alderman Sir William Walker, a past-president of the Incorporated Municipal Electrical Association and well known for his activities on the National Joint Board and National Joint Industrial Council for the Electricity Supply Industry. He is a member of the Institutions of Electrical and Mechanical Engineers and until quite recently was a director of Henry Simon, Ltd. He was knighted in 1945.

Lieut.-Col. E. H. E. Woodward, general manager of the North Eastern Electric Supply Co. with which concern he has been connected for thirty-eight years. He is a vice-president of the Incorporated Association of Electric Power Companies. He holds the Territorial Decoration and the M.C.





(Above) Alderman Sir W. Walker, (left) Mr. T. Johnston and (below) Mr. E. W. Bussey

Mr. T. Johnston becomes a member *ex officio* as chairman of the North of Scotland Hydro-Electric Board.

He was formerly Secretary of State for Scotland.

Area Board Chairmen

The Act provides that four of the Area Board chairmen shall serve in rotation as members of the British Electricity Authority and in consequence the Minister of Fuel has invited the following to be chairmen-designate of the Area Boards named and in that capacity to serve on the Central Authority as soon as their Boards have been constituted:—

Mr. J. Eccles, city electrical engineer of Liverpool, president of the I.M.E.A. and vice-chairman of the British Electrical Development Association. (Merseyside and North Wales Board).

Alderman W. S. Lewis, vice-chairman of the West Midlands Joint Electricity Authority, area secretary of the Electrical Trades Union and a former Lord Mayor of Birmingham. (Midland Board).

Mr. J. S. Pickles, Dumfries county electrical engineer and immediate past-president of the I.M.E.A. (South-West Scotland Board).

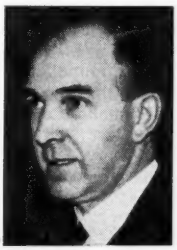
Mr. H. J. Randall, managing director of the City of London Electric Lighting Co., Ltd., and president of the British Electrical Development Association for 1946-47. (London Board.)

Sir Henry Self, Mr. Hacking, Lt.-Col. Woodward, Mr. Eccles and Mr. Bussey are all members of the Organizing Committee set up last May as a preliminary measure. Sir Johnstone Wright, chairman of the Central Electricity Board, was the other member of the Committee.

Terms of Appointment

The Minister of Fuel and Power has made the Electricity (Central Authority and Area Boards) Regulations, 1947 (S.R. & O. 1947 No. 1750) under Section 3 of the Electricity Act, 1947. These stipulate that appointments by the Minister under paragraph (*a*), sub-section (2), and paragraph (*a*), sub-section (3), to the Authority and Boards shall be for a term not exceeding five years but members shall be eligible for re-appointment. Members appointed under paragraph (*b*) of sub-section (2) of Section 3 shall serve for a period not exceeding three years.

Members are required to disclose to the Minister their interests in similar undertakings to those carried on by the Authority or Boards and may be required to dispose of them; their trade or business; and other connections. They must also reveal the nature of their interest in any contract made by the Authority or a Board.



Three chairmen-designate of Area Boards:—Mr. J. S. Pickles, Mr. H. J. Randall and Mr. J. Eccles

Positions on the Authority or Boards may be declared vacant by the Minister if a member is absent from meetings for more than six months except for an approved reason; if a member becomes unfit, in the Minister's opinion, to continue in office or incapable of performing his duties; or if a member continues to engage in any trade or business or holds an appointment after being notified of the Minister's disapproval. Members may resign on three months' notice.

The regulations also make provisions regarding proceedings.

Secretary Wanted

The Organizing Committee is inviting applications for the position of secretary to the Authority. Applicants are required to have held responsible administrative or executive positions in large-scale organizations, preferably associated with industry. It is stated that the post will carry a salary commensurate with the responsibilities and provision will be made for superannuation.

Rhodesian Cable Company

A NEW company has been registered in Southern Rhodesia with the title Rhodesian Cables, Ltd., to carry on the business of manufacturers and dealers in cables, conductors and wires, etc. The company has an authorized capital of £600,000. The British address is Alderman's House, Bishopsgate, London, E.C.2, where Barton, Mayhew & Co., chartered accountants, are authorized to accept service of process and notices on behalf of the company.

Views on the News

Reflections on Current Topics

THE hope, tentatively expressed six weeks ago, that the issue of B.S.1363 might perhaps terminate the controversy about the form of the "all-purpose" socket outlet now seems to have been a pious aspiration. An addendum has appeared! It is designated No. 1, which fact is ominous, and it is already being spoken of as an amendment, which it definitely is not. It will be remembered that the specification (*Electrical Review*, July 18th, 1947, p. 92) provides for the accommodation of a fuse of alternative rating within the plug portion of the outlet. The smallest rating allowed for is 3 A, but that size will not suffice to protect any and every kind of appliance; for example, some types of radio sets.

* * *

The addendum is therefore explanatory, nothing more. It states that "a fuse link in a plug or in a circuit fuse may not adequately protect an appliance connected to the plug or to the circuit. In such circumstances, an additional fuse is required for the protection of the appliance." The ruling word in this plain statement is "may" and it means simply that a fuse of smaller rating than 3 A is sometimes needed in addition to that in the B.S.I. plughead and the other required by I.E.E. Regulation 201 to be in every final sub-circuit.

* * *

A new note was introduced into the overload warnings given by the B.B.C. in its early-morning news bulletins. Listeners were asked to switch off (or not switch on) all apparatus as far as possible because there was a danger of stoppages through generating plant being out of service for overhaul. I look forward (with other consumers) to the return of the good old days when the use of a switch did not give a severe jar to the conscience.

* * *

What is an electrical inspector? The question is prompted by some notes appearing in the August *Electrical Supervisor* dealing with two recent advertisements for electrical inspectors. One of these appears to call for a technically-trained man and offers an "N.J.B." salary of £413, while the other seems to refer to a skilled electrician, payment of the N.J.I.C. (London Area) rate of 2s. 10½d. per hour being mentioned. For both jobs applicants acquainted with the regulations governing all types of installations are required. I agree with the *Supervisor* that some kind of regularity is called for here. An electrical inspector should be a responsible official, not merely an electrical tester, and should be remunerated according to his status.

* * *

The Ministry of Fuel and Power may be surprised to learn from the *Star* that it has recommended electricity companies (why companies only?) "to wire up customers' circuits into five groups so that they can take power cuts in turn each day of the week." This is a strange interpretation of the "one day out a week" proposals. Apart from suggesting that each group takes a turn each day it arouses visions of rather extensive rearrangements of distribution systems.

* * *

The following is an extract from a comment by "Janus" in the *Gas Times* under the heading "Ministers are a Menace," dealing with the relationship between the number of gas and electric cookers made:—

> "On the known facts of free choice by customers, one would say off-hand: 'Yes; nine gas and one electric! That is about the proportion. But the Ministry of Supply has other ideas—with its 'electric' Government behind it—and thinks that two gas and one electric would be about right. Not by any chance can the Ministry justify the adoption of that ratio; but in its power it makes it so, and that's that."

My impression was that the Government had done anything but push electrical methods. Moreover, the fact that electric cookers are so difficult to obtain belies the suggestion that the proportion favours them. "Janus's" figures may apply to the numbers of the respective types in use, but not to the demand on the part of those now setting up home. Hull is a case in point (although perhaps exceptional). There, it is reported that 91 per cent of those ingoing tenants of permanent houses completed last year who were permitted free choice decided to cook by electricity.

—REFLECTOR

Toroidal Coils

Improved Winding Machine

By E. R. Brooke

THIS machine was designed during the war by the author while employed at the Admiralty Anti-submarine Experimental Establishment to facilitate the production in increasing quantities of toroidal coils for transformers and chokes.

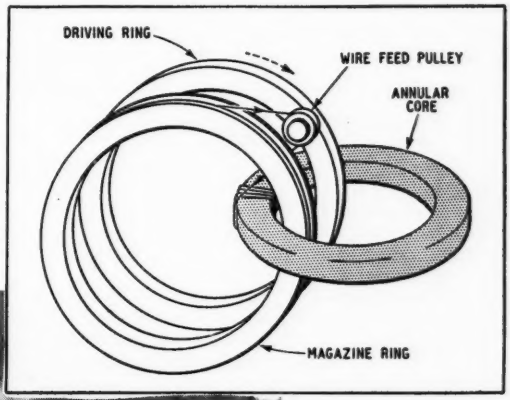
Coils of this kind had previously been constructed by threading pre-formed coils on to cut sections of dust-core rings; these sections were then bolted together to form a closed ring. Disadvantages inherent in the old method have been largely eliminated by winding directly on to closed moulded rings by this machine and, in addition, more compact transformers of greater reliability have been made at lower cost in this way.

When winding on to an annular core each turn of wire must be fed through the central space; to accomplish this two steel rings about four inches in diameter are set side by side and both are provided with detachable segments. The magazine ring is of channel section, forming a spool, while the driving ring carries a pulley (Fig. 1) over which wire is fed to the core.

The magazine ring is actually driven by the wire and the speed at which it rotates therefore depends upon the linear speed of the wire. Considerable cyclic variations of the wire's speed occur when cores of small mean diameter are being wound and consequently the magazine ring is not able to follow these variations exactly, because of its inertia.

Breakage due to this cause is avoided by the periodic application of a brake to the magazine ring to slow it down rapidly at a critical part of the cycle. This "brake on" period needs to be set to suit the dimensions of the core.

The core has to be clamped and rotated at a speed high enough to prevent adjacent turns overlapping. When section winding, the core must turn through an angle of 360 deg divided by the number of sections and then reverse; the reversals of feed should continue until the requisite number of turns are wound in the section. It must be possible to change



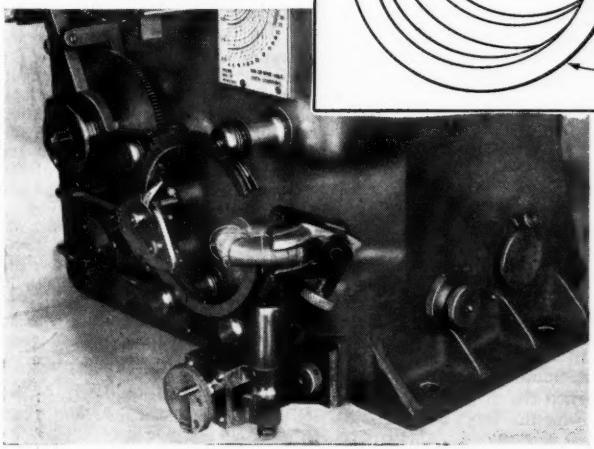


Fig. 1 (right).—Diagrammatic representation of magazine and driving rings
Fig. 2 (below).—Toroidal coil winding machine, part view

easily from one winding section to the next.

The front panel of the box casting (Fig. 2) carries spindles to support the rings and brake gear; the driving motor and core control gear are within the box. The rings are mounted between independent guide pulleys, the magazine ring being free to rotate and the driving ring geared to the motor. They may be coupled by a catch so that they rotate together. The magazine ring brake is cam operated and selection of any of the five cams (Fig. 2, left, cam cover removed) may be made while the machine is running. Controls on the right hand side of the machine enable the operator to set the angle through which the core rotates between reversals, control the reversal point by hand, if desired, and advance the core feed by an angular distance equivalent to that of a winding section when commencing to wind an adjacent section.

The speed of feed of the core can be altered relative to the winding speed and the ratio between the speeds is indicated on a scale.

The bobbin is mounted on a carrier spindle on top of the machine and the wire fed under a tensioning device, over a pulley and down between two felt pads mounted above the rings. The ring segments are then removed, the core inserted and clamped, and the segments replaced. After the rings are coupled together the wire is attached to the magazine ring and the motor switched on by a foot rheostat. When the magazine ring is fully loaded with wire the rings are uncoupled and the wire is cut.

The rotational speed of the core is then set according to the gauge of wire in use and the wire is fed over the driving ring pulley and attached to the core. The winding angle dial at the right hand side of the machine is then set to the required angle and the turn-counter set to zero. The appropriate cam is selected and the motor started in the reverse direction. Winding proceeds until the desired number of turns have been put into the first section.

With the machine stationary, the wire is then fed over into the adjacent section and the core feed mechanism reset. When four sections have been wound in this manner the core is unclamped, rotated through 180 deg relative to the clamp and secured again.

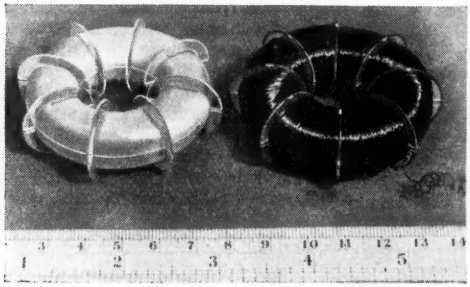


Fig. 3.—Moulded core before and after winding

The procedure just outlined is then repeated until the eight sections are wound. The spare turns remaining in the magazine ring are then pulled off by hand and the wound core (Fig. 3) is removed.

South African News

THE Cape Peninsula's electricity load is increasing at the rate of about 10,000 kW a year according to a recent survey by the city electrical engineer of Cape Town. He said that a new 40,000-kW set would shortly be completed at Table Bay power station and a second machine with the same output would probably be ready for 1950 or 1951.

An unknown factor was what demand the railway administration would make for power in the electrification of the main and branch lines in the Cape Western Province. Part of the load would probably be taken by a power station which the Electricity Supply Commission proposed to erect at Worcester. With the steady annual increase in load, coupled with the pending electrification of the railways, Cape Town would soon need a new power station.

The total consumption of 301·7 million kWh at Durban in the year ended July 31st, 1946, represented an increase of 7·6 per cent over the previous twelve months. The only section in which there was a decrease in sales was in Government departments, due to the reduced requirements for military purposes. The biggest increase in the demand was for municipal lighting and power (17·5 per cent).

The profit of the Johannesburg Electricity Department for the year ended June 30th, 1947, is estimated at £168,958, a rise of £21,247 on the revised estimate of £147,171. In the 1947-48 financial year it is planned to spend £734,000 on the Orlando power station, together with £1,018,000 on the distribution system. The Orlando station will eventually have a capacity of 300,000 kW, but the extension planned for the next few years is only 150,000 kW.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Cashew Resins

HAVING spent many years in the cashew growing districts of East and West Africa and India I was very interested in Mr. A. E. Williams' article on "Cashew Resins" in the *Electrical Review* of August 15th. I must admit, however, that my main interest in this nut still remains in its edible qualities.

Mr. Williams states:—"Its fruit consists of a nut surrounded by a thick pulpy casing containing an irritant liquid which burns the skin. . . ." This is not quite correct. The fruit of the cashew is about the same size and shape as a small pear, a very soft fruit, exceedingly sweet and juicy. After eating it one's mouth is left very dry and tight with a bitter taste. The nut grows at the extreme end of the fruit.

The native method of burning the "pulpy casing" to extract the kernel also tends to damage it. The Indians of Cochin have got the removal of these kernels down to a fine art though I regret I have never seen it done. Thousands of tons of nuts are shipped every year from Portuguese East Africa to Cochin to have the kernels removed from the nuts by experts. These kernels, raw or roasted and salted, are very pleasant and are eaten all over the world, in large quantities, with the usual exception, of course, of Britain.

*London, W.C.*1. G. M. DUNBAR.

Load Spreading

YOUR leader of August 8th suggests that to shut down industries on rota for one day, 8 a.m. to 5.30 p.m., will be serious unless a good deal of overtime is worked, referring particularly to the "Eastern Region."

I attach a complete set of papers describing the schemes proposed for this area. In preparing the schemes leading industrialists were first interviewed. They all preferred a clean cut scheme where disorganization is restricted to a named day each week. It requires that from eight to nine hours of normal working time shall be fitted in on 4½ days as overtime. For continuous or semi-continuous shift work, normally shut down from Saturday noon to 6 a.m. Monday, the proposal is to shut down from Saturday 10 p.m. to Monday 6 p.m.

It appears to industry here that the load spreading necessity is serious in any case and must entail stopping of machinery between 8 a.m. and 5.30 p.m. In selecting the rota of stopping the best way to diminish its seriousness is to organize it clearly and to have the concurrence of those concerned. We have obtained that concurrence here so far as concerns from 80 to 90 per cent of the day-working industries. Negotiations are proceeding in connection with special cases, after meetings which have been attended by the separate groups.

I would not be understood to minimize the difficulties which will beset this or any other practicable scheme. There is a great deal yet to be learnt as to the diversity of the different groups. But the first two or three weeks of October should be very instructive and allow of many necessary adjustments being made.

The position outlined in this letter has been achieved by dividing the whole of the industrialists into their particular groups and meeting them all for frank discussion of the position. This has involved about ten meetings of very large groups but the result is worth the effort. D. BELLAMY,

Hull. *General Manager*, Corporation Electricity Department.

[Further reference to the Hull load-spreading scheme is made on page 327 of this issue. —EDITORS, *Electrical Review*.]

Armature Drop Testing

METHODS of testing depend on the type of armature.

Lap winding (*in series machines*).—Apply d.c. (for a vacuum cleaner armature this may be about 60 W such as might be given by a 60-W lamp in series with the line and for a 10 h.p. 230-V armature about 10 A such as a 2-kW fire in series with the line) to the commutator at approximately ¼-¼-½ way round depending on size of commutator.

A millivoltmeter or ammeter (the most suitable type being a moving coil with either a variable series resistance or variable shunt attached) is then tapped on to two adjacent com-bars and the current input or meter resistance is adjusted to give a good reading, say three-quarters full scale. The meter leads should then be taken to the next bar

where the reading given should be of the same value, and so on until the opposite line is encountered when the input leads are moved round and again the meter leads tapped on, etc.

"High reading" denotes an open circuit or partial open circuit (depending of course on the voltage rise) either on the connections to the two adjacent bars or in the coil attached to the com-bars. "No reading" will indicate either a dead short across the mica or in the leads connecting the coil to these bars.

Partial low reading means a partial short across the mica or shorted turns in the coil attached. To eliminate one of these the leads to the two com-bars can be lifted from the bars but kept together and the test is carried on. This, of course, rules out the com-bars. If the reading, when taking a series of recordings, suddenly rises or falls and then remains steady and then later (say half way round) returns to original reading there is a short between coils.

Wave windings(in shunt machines).—Slightly lower input should be used. The meaning of the readings is much the same but it should be remembered that in case of a high reading the source of the trouble (in the case of a four-pole machine) could be on the exactly opposite side of the commutator, and in a six-pole machine may be at one of three places 120 deg. apart.

In case of a dead short or partial short (low reading) it will be noticed that for one low reading on one side there will be two low readings on the opposite side (for four-pole). The source of trouble is at the place of the one low reading. Again, a sudden rise or fall in readings will denote a short between coils.

Windings with equalizers.—There will be a sudden rise or fall in readings unless the d.c. supply is each time tapped on to the com-bars bearing the equalizers. If the equalizer connections cannot be found the rise and fall will be noticed to be equi-distant around the commutator.

Double re-entrant winding (mostly in varispeed a.c. motors).—The meter will read one forward one backward, one forward and one backward, and so on, so it is therefore necessary to employ a meter with a centre zero for this purpose.

A book would be needed for the full interpretation of readings as there are so many different types of armature connections. Should Mr. Goirer need further details I suggest that he studies "Armature Windings and Motor Repairs," by D. H. Braymer, published by McGraw-Hill in 1920.

West Bromwich. E. F. WESTBURY.

[Similar explanations are offered by Mr. C. H. Anderson (Cardiff) who points out that the testing current should not exceed 75 per cent of the full load rating, otherwise the armature will be overheated, and Mr. H. Bloch (Express Electric Co., London) both of whom state that experience will enable the type of fault to be identified by the variation of meter readings; also from Mr. H. Brown (Forest Gate) and Mr. C. F. Harding (Stafford) who defines the test in terms of Ohm's law and explains how a known resistance may be compared with an unknown (armature), their ratio equalling that of the two falls in potential.—Editors, *Electrical Review.*]

Water Heaters for Housing Schemes

IT staggered me, even in these times, to learn from the leaderette in your issue of August 22nd that Government Departments are putting a veto on electric water heaters. I have been out of the water-heating game since 1939, but could give a dozen reasons for their superiority from a national point of view.

The individual consumer's demand can be substantially reduced by the common cooker/water heater change-over switching arrangement. Better still, a high diversity factor between consumers and reduction of load could be secured by an automatically controlled supply. Such systems are available, or were before the war, whereby carrier high-frequency signals are sent out from the generating station to regulate the controlled load. Incidentally a "controlled supply" of this kind does merit a considerable reduction in tariff to the consumer.

It is to be hoped that water heater makers and the authorities concerned are not too busy to study well the merits and guard against the mistake of discouraging the use of the modern labour-saving water heater.

London, N.W.6. C. G. NOBBS.

Australian Plant Extensions

THE State Electricity Commission of Victoria has recently placed an order with C. A. Parsons & Co., Ltd., for the first section of the new plant it proposes to install at Yallourn to increase generating capacity from 175,000 to 300,000 kW. The order comprises two steam turbo-generators, the total price being £547,965. One generator is expected in 1950 and the other in the following year.

The new 25,000-kW power plant at South Fremantle is expected to be almost completed by the end of the year.

PERSONAL and SOCIAL

News of Men and Women of the Industry

PRINCESS ELIZABETH has accepted the invitation of the Royal Society of Arts to become its president.

Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research, and **Sir Lawrence Bragg,** Cavendish Professor of Experimental Physics, Cambridge, are to receive the honorary degree of LL.D. from the University of St. Andrews during the Dundee meeting of the British Association.

Mr. H. Walton, A.M.I.E.E., district mains engineer with the Carlisle Corporation Electricity Department, has been appointed mains superintendent in the Kirkcaldy Burgh Electricity Department.

Mr. W. J. Brind, late managing director of Tradewinds (London), Ltd., has been appointed general manager of African Representations, Ltd., Nairobi, and he invites manufacturers with products for Kenya, Uganda, Tanganyika and Zanzibar to get in touch with him. His address is P.O. Box 592, Nairobi.

Mr. W. H. Perkins of " Glenelg," 78, Amberley Gardens, Stoneleigh, Ewell, Surrey, has been appointed London area manager for Trustful Products, Ltd., and will commence his duties on September 1st.

Mr. J. T. May has been appointed sales manager for Alliance Wholesale, Ltd., covering the South Midlands Area. The appointment dates from September 1st.

Mr. Felix Rogers informs us that because of increasing pressure of his duties in the Apparatus Division of B.E.A.M.A. he has found it necessary to delegate his office as secretary to the Electrical Fair Trading Council to **Mr. A. S. Lowe,** who from October 1st next will devote his full time to the work of the Council and its committees. Mr. Lowe, who is forty-three years of age, has been with W. T. Henley's Telegraph Works Co., Ltd., for the past twenty-seven years in a technical and commercial capacity, the greater part having been on the sales side and latterly as deputy to the London manager.

Mr. A. S. Lowe

Mr. E. Martin, who as we recently announced, has been appointed general manager of a new company, the African Britannic Cable & Wire Corporation (S.A.), Ltd., Johannesburg, left for Johannesburg on August 21st. His address in South Africa will be P.O. Box 649, Johannesburg. As we have already reported, there is no connection between the South African company and the Britannic Electric Cable & Construction Co., Ltd., Iver, Bucks.

Mr. G. H. Phillips, M.B.E., has been appointed sales representative by T.M.C.-Harwell (Sales) Ltd., for " Temco " synchronous electric clocks for Scotland, Northern Ireland and the four Northern Counties of England. Mr. Phillips was with J. H. Tucker & Co., Ltd., for many years.

Mr. S. F. Philpott, M.I.E.E., has been appointed chief electrical engineer to S. Wolf & Co., Ltd. Throughout his career Mr. Philpott has specialized in the design, manufacture and application of fractional - h.p. motors and has contributed articles on this subject to our pages from time to time since 1927. Since 1945 he has been in charge of motor development with R. B. Pullin & Co., Ltd., and before that was on the staff of the Witton works of the General Electric Co., Ltd.

Mr. S. F. Philpott

Mr. D. Maxwell Buist, M.I.E.E., M.I.Ex., export director of the British Electrical & Allied Manufacturers' Association, is at present on a short visit to Austria, on behalf of the Board of Trade and British electrical manufacturers, to investigate future electrical developments in that country.

The Minister of Transport announces that he has appointed **Sir Eustace Missenden** to be chairman of the Railway Executive, and **Lord Latham** to be chairman of the London Transport Executive under the Transport Act.

Mr. T. B. Nutter, Burnley Corporation electrical engineer for the past five years and associated with the Electricity Department for over forty years, retired on superannuation on August 22nd. He is a Burnley man, and joined the Electricity Department on leaving school.

Mr. N. R. Rice, B.Sc. (Eng.)., A.M.I.E.E., in informing us of his marriage on August 25th, states that his address is now 50, Eden Park Avenue, Beckenham, Kent.

Messrs. D. M. M. Brunton and **F. R. Robbins,** research manager and export manager respectively of Belling & Co., Ltd., have just left on an extensive tour of the United States and

South America for the purpose of investigating sales possibilities in these markets. They expect to return in December.

Mr. H. W. Bailey has been appointed to the board of directors of the Radio & Television Trust, Ltd.

Mr. George Barrow has retired from the board of the Revo Electric Co., Ltd.

A cricket match between the West Yorkshire and the Huddersfield Branches of the Electrical Contractors' Association was played on the Lascelles Hall Cricket Ground, Huddersfield, on August 20th, 1947, in perfect weather. Each side batted for twenty overs, each player, excepting the wicket-keeper, bowling two overs each. The result was a victory for the W.Y. Branch who scored 140 for 3 wickets; Huddersfield scored 60 for 8 wickets. The match was followed by tea in the Pavilion, and was attended by about sixty players and friends.

The Crompton Parkinson Social Club (Birmingham Branch) held its second annual summer outing on July 26th. An enjoyable day was spent by members of the staff who went by coach to Abingdon-on-Thames, where lunch was served, then by coach to Wallingford where they boarded a steamer for a trip on the river, returning to Abingdon in time for tea. On the way home stops were made at Banbury and Warwick, which rounded off a very excellent trip.

Obituary

Mr. G. A. Egles.—We regret to record the sudden death on August 21st, at the age of sixty-three of Mr. George A. Egles, of Laurence, Scott & Electromotors, Ltd. Mr. Egles had been with the company for forty-five years, and for more than half that time had been in charge of the switch and control gear drawing office.

Mr. F. W. Hodges.—The death occurred on August 21st at the age of ninety of Mr. Francis William Hodges, late Assistant Comptroller of H.M. Patent Office.

Mrs. A. E. Farrow.—We are sorry to learn of the death on August 16th of Mrs. Isabella Farrow, wife of Mr. A. E. Farrow, director of the Woodstock & District Electrical Distribution Co., Ltd.

Mr. A. Southworth.—We announce with regret the sudden death on August 20th of Mr. A. Southworth, chief engineer of the G.E.C. Engineering Works, Witton. He was forty-seven. Mr. Southworth, who was appointed chief engineer in 1945 in succession to the late Dr. M. L. Kahn, was educated at Liverpool University and held the degree of B.Eng. He served his apprenticeship with Dick, Kerr & Co., and after serving in the Army in the 1914-18 War, he returned to that company as a designer specializing in traction. He joined the General Electric Co. in 1936 as chief of the Traction Motor Design Department. During the war he was engaged exclusively on secret development work in connection with large searchlights, radar and fire-control problems. Since his appointment as chief engineer, Mr. Southworth had been actively engaged on the design of large alternators to meet the present urgent national requirements for generating plant.

The late Mr. A. Southworth

He had just returned from a visit to the U.S.A. in the course of which he inspected modern installations and up-to-date generating stations.

Wills.—**Mr. R. F. Winder,** electrical contractor, governing director of R. F. Winder Ltd., Leeds, left £71,857 (net personalty £70,322).

Apprentice Electricians

National Scheme Established

NEGOTIATIONS have practically been completed for the introduction, in October, of an indentured apprenticeship scheme for the electrical contracting industry. We are informed by Mr. L. C. Penwill, director and secretary of the National Federated Electrical Association, that the scheme will comprise an industrial agreement applicable to all apprentice indentured after the date of its introduction.

There will be a National Joint Apprenticeship Committee and such local committees as may be necessary. The indenture deed will be signed by the apprentice, the employer, the guardian and an independent person appointed by the national or local committees whose functions are to ensure the efficient training of the apprentice and to act as referee in disputes.

The employer will undertake the apprentice's teaching and instruction and arrange for his compulsory attendance at technical classes up to the age of eighteen (voluntary attendance after that age is to be encouraged.)

Apprenticeship may begin before the age of sixteen in suitable cases. There will be a probationary period of three months at the most which should count as part of the apprenticeship. The apprenticeship should not end before the apprentice is twenty-one and in normal cases will be for five years (16 to 21). A register of indentured apprentices will be kept by the National Joint Industrial Council.

Among the matters covered in the apprenticeship deed is wages, including payment during technical education periods, when the apprentice is absent at the request of the employer through slackness of trade and in sickness.

Copies of the scheme and deed of indenture are to be circulated to members of the N.F.E.A. as soon as possible.

Spot-weld Testing

Magnetic Inspection of Stainless Steel Fusion

A QUICKER way than radiography of gauging the soundness of spot welds in austenitic steel sheets has been devised by the Metropolitan-Vickers Electrical Co., Ltd. Previous research suggested that the rather special magnetic properties of chromium-nickel stainless material might be a criterion of the temperature history of spot-welds, since changes occur when it is stressed by working, rolling, shearing, or relieved by heat treatment; also the magnetic permeability is always increased by welding, this change being appreciable in good welds and very small in bad welds.

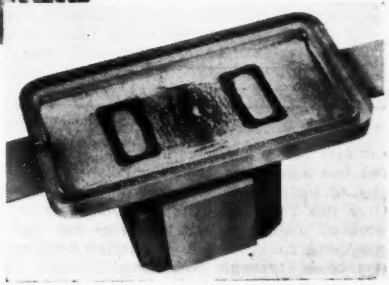
The magnetic properties can be measured by means of a differential inductance bridge working at 50 c/s, but that is an unsatisfactory instrument to use in sheet fabricating shops, as great care is needed to obtain consistent results.

Examining spot welds in a gas turbine combustion chamber and (right) steel strip between detector cell and permanent magnet

The " Metroflux " captive fluid cell is a simple detector. It is a transparent plastic moulding, which can be of any size or shape, in the form of a shallow dish with a thin diaphragm forming a back that is usually opaque and white. In the cell is sealed a small quantity of black fluid made up of minute magnetized particles suspended in a light oil. If shaken well to disperse the particles and laid down on a magnetized sheet containing a spot weld, the particles will " swim " to the magnetic spot and reveal it as a particle pattern on the white diaphragm (see photograph) between the poles of a magnet placed under the steel strips. This will only occur if the magnetic properties at the spot differ appreciably from those of the parent sheet. Thus the detector only shows up those spots that have reached a high enough temperature during welding to produce satisfactory welds.

In some welded spots the residual flux is sufficient to produce these particle patterns, but results are achieved with far greater speed and certainty if some external magnetization is applied to the sheet simultaneously with the captive fluid detector. For this purpose permanent magnets or electromagnets can be used, depending upon the accessibility of the spots to be checked. In inaccessible places where it is impossible so to place the detector cell that a particle pattern can be observed, free magnetic fluid of rather greater than normal concentration should be sprayed over the spots; this will tend to show the particle patterns on the surface of the metal, but it is not so satisfactory as the captive-fluid method.

From extensive use in the M.V. works, two types of particle pattern have become known, depending upon the direction in which the external magnetization is made to traverse the spots. In the " black spot " procedure the flux from the exciting magnet is made to flow axially up to the spot normal to the sheet surface and up into the detector cell. The more permeable spot tends to act as magnetic extensions to the exciting magnet and so draw the particles to them in dark clusters in contrast to the lighter concentrations associated with the less magnetic parent sheet. In this way black spots are seen against the whiter background of the detector cell. In the " white spot " procedure the flux is made to flow diametrically across the spot, parallel to the sheet and across the bottom of the detector cell. The particles then tend to accumulate at the entry and exit arcs of the spot circles, leaving a lighter space between the dark " brackets " which are so formed.



The " black spot " is to be preferred because of the lesser likelihood of a bursting bubble in

the detector cell being mistaken for a white spot.

Dexterity is soon acquired. It is not necessary for the magnetization to be close to the material, provided it is sufficient; it can be an inch or two away and tests are best made with the detector in a horizontal position so that gravity helps to settle the particles, giving the greatest sensitivity. Faulty spots can be marked, rewelded and then retested. Variously shaped detectors and magnets can be obtained from the New Products Sales Department of the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.

Main-Line Electrification

Resumption of Manchester-Sheffield Scheme

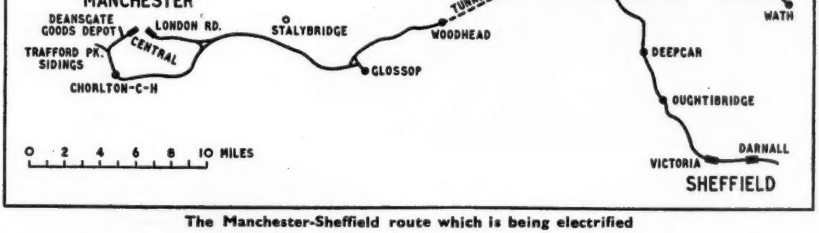
THE London & North Eastern Railway is to resume the work of electrifying its Manchester-Sheffield main line, together with the lines from Barnsley Junction to Wath and from Fairfield to Trafford Park and Manchester Central, a total of 75 route miles or 300 track miles, including sidings. The scheme will cost approximately £6,000,000, take four years to finish and save about 100,000 tons of coal per annum. The adoption of electric traction for all trains will enable accelerated services for both passenger and freight to be introduced.

The Manchester-Sheffield main line is one of the most difficult to operate in the country. It has very heavy gradients and near its summit, 943 feet above sea level, the Pennine ridge is pierced by the 3-mile-long Woodhead tunnel. Over this route an extremely dense traffic is worked, about six out of every ten trains conveying coal. Nearly 100 trains daily each way pass through Woodhead tunnel, the capacity of which will be increased by 25 per cent by electrification. The tunnel has always been difficult to ventilate and a further advantage will be the elimination of smoke and fumes which are troublesome to enginemen and destructive to the tunnel lining.

The electrification scheme was well in hand and all the main contracts had been placed before the war caused the work to be suspended. It was, however, possible to complete at Doncaster the first 1,870-h.p. mixed traffic electric locomotive equipped with Metrovick traction gear, which underwent successful trials on the Manchester-Altrincham electric line in 1941. Minor modifications were subsequently carried out and the locomotive has recently made further trial runs on the Manchester-Altrincham line.

The overhead line conductor system using d.c. at 1,500 V to be employed is similar to that used on the Manchester-Altrincham line for the past sixteen years and now being installed on the main and suburban lines of the L.N.E.R. from Liverpool Street and Fenchurch Street to Shenfield.

Electric locomotives will haul all trains between Manchester and Sheffield and will be fitted with electrically-heated boilers to give steam heating in the passenger trains. Between Manchester (London Road), Hadfield and Glossop, however, a suburban service will be provided by multiple unit electric trains. The main electrical repair shops and running sheds for dealing with inspection, repairs and general overhaul of the electric locomotives and electric rolling stock will be located at Levenshulme, with two smaller running sheds at Darnall, near Sheffield, and at Wath.



The Manchester-Sheffield route which is being electrified

Swedish Hydrographic Survey

THE Decca Navigator Co., has secured from the Swedish Government a contract for a complete Decca Navigator system comprising three transmitting stations and marine receivers for the purpose of hydrographic survey in Sweden and the surrounding seas. A similar system has already been supplied to the Danish Government.

COMMERCE and INDUSTRY

Alternators from South Africa. Hull Load Reduction.

TO help to relieve the present shortage of generating capacity in Great Britain the First Electric Corporation of South Africa is now completing 20,000 kVA of alternator plant for Davey, Paxman & Co., Ltd., and the Brush Electrical Engineering Co., Ltd. It is understood that this is the first occasion on which South Africa has supplied equipment of this nature to Britain. Giving details of the contract, the *South African Mining & Engineering Journal* says that the plant will be installed in British factories as standby sets to help to keep up production during the power cuts and will ensure the continued employment of 20,000 workers in the various factories where the plant is to be installed.

Four sizes of alternators, all for 250/440-V, 3-phase supply, are being manufactured:—100 20-kVA, 100 30-kVA, 250 50-kVA and 54 100-kVA, all at 0·8 power factor. Standard F.E.C. designs have been used, all machines being of the rotating armature type. The 100-kVA units are arranged for V-belt drive with separate belt-driven exciter. Fabricated steel construction has been used for the armature spider and base-plate. "Meehanite" castings have been used instead of cast-iron for the alternator barrel and end shields. All the machines are vacuum impregnated. Approximately 90 per cent of the material used in the construction of the alternators is of local origin.

Coal Prices Up Again

An increase of 4s. per ton, to take effect on September 1st, is announced by the National Coal Board. A further rise is forecast for October 1st when the higher rail charges begin to operate. The Board attributes the increase to the greater wage bill following the institution of the miners' five-day week. Other factors are the increased cost of materials and additional staff recruited by the Board.

Economics for Engineering Students

The Post-War National Development Committee of the Institution of Civil Engineers has produced "An Introduction to Engineering Economics for Civil Engineering Students." Engineering economics may be generally defined as the art of comparing values to guide in the selection of projects and designs which are technically sound and financially advantageous. The handbook deals first with the promoter's interest in economics and then refers to the necessity for an understanding of the fundamental mechanism of finance if the engineer is to apply his technical experience with economic advantage. But consideration of cost alone with a disregard of life may result in mere cheapness, which is not necessarily a true criterion of value and various factors which have to be considered such as depreciation, maintenance, running costs, overhead charges, etc., are discussed.

After dealing with the civil engineer's use of the economic mechanism in connection with requirements, planning and design, construction, guarantees and tolerance, tender particulars and mathematical solutions, a number of problems and examples are given and solutions are worked out so that the student can appreciate how the principles laid down in the handbook should be applied to meet various definite problems. The handbook ends with some valuation tables and an appendix dealing with mathematical derivations. It is issued at the price of one shilling.

"Enterprise Scotland 1947"

The Scottish National Exhibition "Enterprise Scotland, 1947," opened in Edinburgh on Monday last. Electrical and allied concerns whose goods have been selected for the exhibition include the following:—British Made Electrics, Ltd.; British National Electrics, Ltd.; E. K. Cole Ltd.; Ekco Ensign Electric, Ltd.; J. & G. Coughtrie, Ltd.; Robert Maclaren & Co., Ltd.; Scottish Heat & Vacuum Ltd.; British Vacuum Cleaner & Engineering Co., Ltd.; Buccleuch Radio Manufacturers; Carron Co.; Vactric, Ltd.; Aeroplastics, Ltd.; Philips Hamilton Works, Ltd.; Vidor, Ltd.; Smith's English Clocks, Ltd.; British Ropes, Ltd.; Coastal Radio, Ltd.; Kelvin, Bottomley & Baird, Ltd.; MacTaggart, Scott & Co., Ltd.; Marine Instruments, Ltd.; North British Electric Welding Co.; Scottish Cables, Ltd.; Barr & Stroud, Ltd.; Dent & Co. & Johnson, Ltd.; Ferranti, Ltd.; Lumsden Lamp Co.; Mu-Tron, Ltd.; W. B. Nicholson (Scientific Instruments), Ltd.; Peter Stevenson, Ltd.; and John Thomlinson, Ltd.

Load Spreading in Hull

The memoranda sent by Mr. Bellamy, manager of the Hull Electricity Undertaking, with his letter (published on page 321) contain details of the load-spreading scheme which has been adopted by the Hull District Committee of the East and West Ridings Regional Board for Industry. Industries have been divided into six groups. In the first group (metal industries) there are four sections with approximately equal electrical loads and one section will be shut down completely from 8 a.m. to 5.30 p.m. on one day between Tuesday and Friday. Industries in the second group will be similarly dealt with. Group 3, comprising continuous or semi-continuous process industries will re-start after the normal week-end

shut-down at 6 p.m. on Monday. Perishable goods industries (Group 4) cannot close down for a day but may be called upon to reduce load at a few minutes' notice. In Group 5 are certain large consumers with whom arrangements can be made to throw off load at very short notice. Group 6 contains industries in the first three groups who, in emergency, may be called upon to reduce their loads.

Industries desiring to make up the time lost by having to close down will work overtime on the " permitted " days or by working Saturday morning or afternoon or on Sunday. It is suggested that Group 3 firms, instead of shutting down at 6 p.m. on Friday, 6 a.m. on Saturday or noon on Saturday could extend working hours to make up for the time lost on Monday. Industries which shut down one day must not impose increased loads during the period from 8 a.m. to 5.30 p.m. or other week-days in an endeavour to make up lost production.

St. Helens Jubilee

Mr. P. Bregazzi, the borough electrical engineer and manager of the St. Helens Corporation Electricity Department, has sent us a copy of an attractive brochure which has been prepared to commemorate the jubilee of the electricity undertaking. Besides including a history of the undertaking, with pictures of both old and present-day plant, there are photographs taken on the occasion of Lord Citrine's visit during the official celebrations of the event on July 21st.

Lighting Design Course

The first Illumination Design Course to be held in the Birmingham Area since the end of the war has been arranged by the E.L.M.A. Lighting Service Bureau to be held from September 22nd to 25th. Applications for reservation should be made to the Lighting Service Bureau at 2, Savoy Hill, London, W.C.2. Similar courses are being arranged for Manchester, Stoke-on-Trent and Sheffield, and a special one-day industrial lighting conference is to be held in Coventry. The London Autumn Design Courses to be held include the forty-ninth (a day course) and the fiftieth (an evening course). An innovation of the day course is a three-day continuation course open to anyone who has attended any of the normal post-war day courses.

Gauge and Tool Makers' Exhibition

The Council of the Gauge and Tool Makers' Association has decided to arrange an exhibition in January/February, 1948. It has been agreed on this occasion to invite the co-operation of the National Federation of Engineers' Tool Manufacturers, and with that object in view, the Old Hall as well as the New Hall of the Royal Horticultural Society, Vincent Square, S.W., has been reserved giving total area of 32,000 sq ft. The Exhibition will be open daily from January 26th to February 6th, 1948. As at the previous exhibition, the stands will be of uniform size and design throughout. Further particulars may be obtained from the Gauge and Tool Makers' Association, Standbrook House, Old Bond Street, London, W.1 (telephone: Regent 3451).

Electricity Loans Sanctioned

During the second quarter of this year the Electricity Commissioners sanctioned the borrowing by public authority undertakings (excluding the Central Electricity Board) of a total of £20,164,978. Of this £10,237,770 was in respect of generating plant.

Japanese Electrical Machinery Exports

Under Japan's export programme for 1947, 86 million yen worth of electrical machinery and appliances are to be shipped abroad including fans to the value of 36 million yen and motors valued at 20 million yen. Whether this target will be reached will depend largely on the available supplies of raw materials such as ferro-silicon. Arrangements have already been made for the export of 8,000 12-in. fans to Hong Kong, and 2,000 are ready for shipment. It is believed in Tokyo that a good outlet will be found in Asia for Japanese electric heaters, drills, clocks, etc. Japan's eight leading manufacturers have at present a monthly capacity of over 50,000 electric heaters and over 7,000 fans. Electric motor production last year is estimated at 100,000 units which is about 50 per cent of nominal capacity and 85 per cent of the projected goal.

Aluminium Development

The " Aluminium Courier " is to appear quarterly in furtherance of the aims and objects of the Aluminium Development Association. Each issue will deal mainly with a specific application of this light metal and its alloys, the first being concerned with structural engineering and the large-scale use of aluminium for fabricating houses of the bungalow type. The front cover illustrates a stage in the production of aluminium and the back cover depicts the main theme of the next issue, which will be road transport. The publication is intended to appeal to users of finished products rather than to producers and fabricators.

Condenser Manufacture in Scotland

By the end of November the Telegraph Condenser Co., Ltd., expects to be in full production with the manufacture of condensers at its new factory at Bathgate, known as " Whiteside Works," and by the end of August the company plans to have occupied, and commenced work in, 50 per cent of the site. The factory is being built for it by Scottish

Industrial Estates. It includes full canteen and welfare facilities. The buildings will occupy approximately 100,000 sq ft and it is anticipated will give full employment to about 1,000 people, mostly women. Although the company's business normally covers a wide range and variety of condensers, including paper, electrolytic, ceramic and mica dielectric patterns, it will limit the scope of its Scottish factory to the manufacture of paper condensers.

Fluorescent Lighting on board Ship

The T.S.S. *Corinthic*, a new 15,000-ton passenger-carrying refrigerated meat ship now on the regular service to the Antipodes, is one of the first ocean-going ships to be equipped with fluorescent lighting as an integral part of the architectural design. The use of Mazda "warm-white" fluorescent lamps for lighting all the main public rooms has been eminently successful. Engineers from the Ship Lighting Department of the British Thomson-Houston Co., Ltd., planned the lighting and designed the "Mazdalux" fittings, working in close collaboration with the architects. The a.c. supply for the fluorescent lamps was derived from two 220-V 600-cycle 4·5-kVA motor alternators of B.T.H. design and manufacture, operated from the ship's normal d.c. supply.

Effective use of fluorescent light in the forward lounge of T.S.S. *Corinthic*

Industrial Diamond Bulletin

The Industrial Diamond Information Bureau, Industrial Distributors (1946), Ltd., St. Andrew's House, 32-34, Holborn Viaduct, London, E.C.1, publishes monthly a bulletin containing abstracts of articles dealing with properties and industrial applications of diamonds, together with notices of patents and patent applications in many states. Copies of the bulletin may be obtained, free of charge, from the Bureau.

American I.E.S.

Mr. Howard Long, 115, Hampton Lane, Solihull, Birmingham, draws our attention to the favourable terms upon which membership of the Illuminating Engineering Society (New York) may be obtained. No entrance fee is required in connection with applications received before October 1st, 1947. The practice of charging a fee of $2·50 will be resumed in the next fiscal year. Any advance payment of dues made before October 1st will be credited towards next year's assessment. The I.E.S. Lighting Handbook is sent to members at the price of $2·50; the price to non-members is $7·50. Forms of application, etc., can be obtained from Mr. Long, who is on the Membership Committee.

Homecraft for Service Women

During the summer the Electrical Association for Women has been continuing the courses of homecraft training for Service women. At Regent Street special courses were arranged for groups from the Women's Royal Naval Service and the Auxiliary Territorial Service. Weekly courses started on July 25th and will continue until September 5th, for parties from the Women's Auxiliary Air Force in the London Area.

These courses cover practical instruction in cookery, laundry, meter reading and the general use of domestic electrical appliances. This is one means by which E.A.W. work is related to the Ministry of Education Circular 117, which urges voluntary organizations to co-operate in providing such homecraft training.

Electric Crane Accidents

At the inquest on William Mellor, 46, who was killed while examining an overhead electric crane at the works of the English Steel Corporation, Sheffield, Mr. A. L. Scott, foreman, said he had been working on the same job earlier and had handled three bare electric wires. The power was off. In the afternoon he followed Mellors up a ladder near the wires. He touched the wires with his finger tips and felt nothing. Five minutes later he saw Mellor in difficulties. Mr. W. Grundy said he took the switch out in the morning. He replaced it and used the crane

in the afternoon unknown to Scott. A verdict of " Accidental death " was recorded.

An eighteen-year-old boy, Hugh Gee, touched an electric wire at the works of Daniel Doncaster & Sons, Sheffield, and fell, receiving injuries which caused his death. At the inquest a witness said that, with Gee, he went up a ladder to an overhead crane after having been told that the electric current was off. When he got to the top of the ladder he saw Gee holding the conductor bar and he then fell. Percy Rose, electrician, said he had taken the fuses out when Gee and Marsh wanted to go up the ladder. He then went up to make sure it was safe. He touched the bars but could feel nothing, even when he put his hand flat against them. A verdict of " Accidental death " was returned.

Dissolutions of Partnership

W. D. Bryan and J. E. Drury, carrying on business as electrical and wireless engineers at 1, Sketty Road, Uplands, Swansea, under the style of Uplands Radio Service, have dissolved partnership. Mr. Drury will attend to debts and carry on the business under the same title.

O. J. Gill and R. J. Hill, carrying on business as dealers in, and repairers of, radio and electrical equipment at 184, Henleaze Road, Bristol, under the style of Hill Brothers, have dissolved partnership so far as concerns Mr. R. J. Hill who retires from the firm.

World Fuel Economy Conference

A total British attendance of over 100 is expected at the Fuel Economy Conference of the World Power Conference to be held at the Hague in Holland from September 2nd to 10th. The British delegation will be headed officially by Sir Johnstone Wright (C.E.B.) while the chairman of Section A.5 on Production: Electrical Energy will be Mr. J. Eccles (Liverpool), president of the I.M.E.A. Others attending will include Mr. H. Nimmo (Electricity Commissioner), Dame Caroline Haslett (E.A.W.) and Mr. I. V. Robinson (B.E.A.M.A.).

Electricity Supply Statutes

In view of the considerable modifications in electricity supply legislation made by the Electricity Act of 1947, Mr. Norman Elliott, Barrister-at-Law (general manager, London and Home Counties Joint Electricity Authority) has set out in a work entitled " The Electricity Supply Statutes " the provisions of the earlier Acts as they now stand. As the hon. secretary of the Conference of Joint Electricity Authorities and Joint Boards, the author undertook to prepare a series of notes on the passage of the Bill through Parliament. The demand for them, however, was much greater than expected and the need for such a work was voiced by many delegates at the I.M.E.A. Conference last June; hence the appearance of this book detailing the effects of the Act on the seven principal earlier statutes including the Meters Act of 1936 but not the Hydro-Electric Development (Scotland) Act, 1943. The volume of 127 pages, of which 23 are taken by an index, is obtainable at 10s. post free per copy from the London J.E.A. (Clerk's Office), 5, Lancaster Place, Strand, W.C.2.

New Cinema Equipment

The first cinema theatre in this country to be fitted with the " Gaumont-Kalee 21 " picture and sound projectors, which are claimed to be new and all-British, is the Gaumont Palace in Plymouth. The official " switching-on " ceremony took place last week.

Trade Announcements

Howard Clayton-Wright, Ltd., have transferred the whole of their organization to their new premises at Wellesbourne House, Wellesbourne, Warwickshire, at which address the offices and works of the company and its associate companies, Harrisflex Bearings, Ltd., and Clayflex, Ltd., will now be centralized. The telephone number is Wellesbourne 316.

On September 1st, the Accounts Department of the Mullard Wireless Service Co., Ltd., is returning from its wartime evacuation address at Oxted to the company's head office at Century House, Shaftesbury Avenue, London, W.C.2 (telephone: Gerrard 7777).

As from August 12th, H. H. Linton & Co., Ltd., 34, Osnaburgh Street, Euston Road, London, N.W.1, are sole distributors for Great Britain of the " Erinex " and " Cepco " products of Erinex, Ltd., makers of domestic electrical appliances.

Changes of Name

The Adames Electrical Co., Ltd., has changed its name to Adames Electrical, Ltd. The name of the Crescent Electric & Development Co., Ltd., has been changed to Crescent Webb, Ltd.

Trade Publications

C. A. Parsons & Co., Ltd., Heaton Works, Newcastle-upon-Tyne, 6. — Two illustrated brochures describing surface condensing plant for steam turbines and the manufacture of curved glass reflectors for searchlights and similar purposes.

Aerialite, Ltd., Castle Works, Stalybridge, Cheshire.—Illustrated catalogue of " Ashton " radio cables, cords and wires.

Renold & Coventry Chain Co., Ltd., Renold Works, Didsbury, Manchester.—Brochure (No. 316/211) illustrating varied uses of driving and conveyor chains, wheels and accessories.

Measuring Instruments (Pullin), Ltd., Winchester Street, Acton, London, W.3—Illustrated folder and price-list of miniature indicating instruments, including 3½-in. scale rectangular pattern moving-iron type with illuminated dial.

Frank Whitelegg, 90, Robin Hood Lane, Sutton, Surrey.—Priced and illustrated leaflet on hand-operated coil winders.

Overseas Electrical Trade

Big Increases in Exports and Imports

VERY substantial advances in both exports and imports of electrical apparatus and machinery during July are shown in the Board of Trade returns just published. At £7,333,719 electrical exports were nearly one-third higher than in June and half as much again as they were in July last year, while compared with the average monthly figure for 1938 there was a fourfold advance. The improvements were general throughout practically all classifications, the only items which were lower than in the previous month being generating plant, motor starting and controlling gear, radio valves and "other radio apparatus"; the fall in the exports of the last-mentioned item was more than counterbalanced by a rise in exports of domestic radio receivers.

The decline in generator exports was confined to machines of over 200 kW; increased shipments of the smaller types of plant together with parts brought the total generating plant exports almost up to the June figure. Despite the Government's restrictions on exports of generating plant last month's overseas purchases were still over four times the pre-war monthly average. The largest amount (£115,985) went to India, with South

Table I.—Electrical Exports and Imports

Class	Exports			Imports		
	July, 1947	July, 1946	Monthly Av., 1938	July, 1947	July, 1946	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	103,392	66,286	17,289			
Ditto, not submarine	268,404	373,758	71,803	6,006	2,608	31,246
Wires and cables, other than telephone and telegraph, rubber insulated	512,621	267,230	117,533			
Ditto, insulation other than rubber	520,758	480,357	153,256			
Commercial radio apparatus	128,004	141,769	28,296	*	*	*
Domestic radio receivers	446,730	339,894	36,755	698	7,699	10,148
Telegraph, telephone and signalling apparatus	†655,366	449,052	242,716	6,248	1,248	9,243
Other radio, etc., apparatus	221,412	103,106	57,848	27,319	316,503	47,870
Valves	144,164	99,694	41,272	41,149	8,469	10,893
Electric carbons, furnace	*	*	*	110,545	6,718	4 054
Other electric carbons	*	*	*	211	6,333	2,301
Electric lamps	131,363	132,290	49,440	3,895	80	10,265
Other lighting apparatus	316,330	192,480	48,565	12,141	911	38,662
Primary batteries	54,596	39,748	13,572	5,385	16	3,549
Accumulators, portable	216,727	132,800	28,874	*	*	*
Ditto, stationary	23,302	20,652	19,773	*	*	*
Ditto, parts and accessories	38,848	60,506	—	*	*	*
Electric cooking and heating apparatus	251,245	101,756	30,664	*	*	*
Commercial electrical instruments, including ammeters, voltmeters, etc., and parts	101,541	49,147	15,878			
House service meters	87,288	49,690	15,791	16,149	9,471	32,057
Other electrical instruments	104,363	44,729	9,612			
Electro-medical apparatus other than X-ray	34,142	28,028	3,038	*	*	*
X-ray apparatus, vacuum tubes and parts	90,438	83,229	4,881	34,499	23,406	9,734
Insulating materials, not elsewhere specified	132,800	113,022	19,343	*	*	*
Unclassified electrical goods and apparatus	367,368	297,159	108,083	27,373	11,071	52,980
Generators, complete, up to 200 kW	208,655	86,391	38,071	*	*	*
Ditto, over 200 kW	206,072	154,468	119,079	*	*	*
Ditto, parts	221,374	47,221	—	*	*	*
Railway and tramway motors	53,430	32,466	17,977			
Other motors up to ½ h.p.	36,822	28,102	9,001			
Ditto, over ½ h.p. but under 1 h.p.	29,484	12,786	2,470	8,826	5,484	26,033
Ditto, 1-250 h.p.	244,746	182,614	96,637			
Ditto, over 250 h.p.	45,660	13,784	20,960			
Converting machinery	8,723	3,710	101,304	*	*	*
Transformers including coils	354,178	148,100				
Rectifiers for power house use	23,089	11,994	3,463	*	*	*
Motor starting and controlling gear	88,000	88,805	50,866	*	*	*
Switchgear and switchboards, other than telegraph and telephone	437,778	171,810	184,533	*	*	*
Other electrical machinery	30,398	14,381	15,497	252,394	3,000	14,455
Electric vacuum cleaners and parts	368,903	99,532	26,662	*	*	*
Other electrically-operated portable appliances	25,205	49,574	10,394	2,841	3,925	24,627
Total	7,333,719	4,812,120	1,829,198	555,679	406,942	328,117

* Not classified separately. † The figures for 1947 are not strictly comparable with those for previous years.

Africa taking £77,813 worth, Australia £77,354, Russia £52,075 and Burma £49,146.

India (£742,090) and South Africa (£564,288) also headed the list of electrical goods and apparatus exports, the most striking feature of which, however, was the heavy buying on the part of Sweden. With purchases amounting to £259,122 that country now occupies third place in the table, taking more than either New Zealand (£245,488) or Australia (£243,641). There was also very substantial buying by Brazil (£127,711).

Table II.—Distribution of Exports of Electrical Goods and Apparatus

Destination	July, 1947	July, 1946	Monthly Av., 1938
	£	£	£
Eire	151,411	51,873	37,726
Channel Islands	51,581	45,697	12,177
Palestine	105,125	101,567	8,426
British West Africa	54,306	44,028	12,889
Union of South Africa	564,288	484,630	162,584
Southern Rhodesia	47,322	21,532	9,632
British East Africa	80,036	18,832	7,893
British India	742,090	415,638	123,789
Burma	45,530	25,750	5,337
British Malaya	146,335	117,727	32,792
Ceylon	46,621	26,756	15,048
Hong Kong	61,550	38,461	12,939
Australia	243,641	162,040	197,366
New Zealand	245,488	125,135	96,225
Canada	67,641	10,368	12,547
British West Indies	38,952	11,668	12,954
Other British Countries	92,479	58,738	21,265
Soviet Union	42,567	41,517	36,781
Finland	22,282	42,758	5,969
Sweden	259,122	92,355	14,948
Norway	137,991	66,740	12,881
Iceland	10,678	67,732	2,796
Denmark	82,335	138,854	18,907
Poland	12,391	19,727	9,702
Netherlands	127,466	84,581	22,010
Belgium	95,997	120,190	11,208
France	24,822	60,666	16,082
Switzerland	27,995	17,916	3,768
Portugal	69,298	78,336	6,512
Spain	42,381	117,820	3,813
Czechoslovakia	17,146	9,743	7,256
Yugoslavia	16,357	20,131	1,475
Greece	79,375	24,822	4,926
Turkey	64,165	51,905	7,684
Portuguese East Africa	6,382	4,422	6,942
Egypt	127,913	115,911	13,176
Iraq	84,483	79,314	5,530
Iran	84,014	99,015	16,345
China	109,034	113,849	4,119
United States of America	5,256	9,588	5,839
Mexico	6,932	54,102	1,466
Venezuela	45,845	83,937	2,936
Chile	24,163	18,830	6,635
Brazil	127,711	26,915	11,164
Argentine Republic	166,656	100,237	45,452
Other Foreign Countries	246,049	144,029	46,371
Total	4,951,202	3,666,382	1,134,284

Exceptionally large contracts for India (£145,023) were mainly responsible for the satisfactory position in the domestic radio section. Sales to Palestine (£28,677) and South Africa (£24,294) showed some falling-off from the previous month's figure, but Egypt was a good market, taking £53,541 worth of sets. South Africa accounted for £186,895 of the £655,366 worth of telegraph, telephone and signalling apparatus exported.

The rise in imports is attributable mainly to particularly heavy purchases of electric furnace carbons (£110,545) and to a large advance under the classification "other electrical machinery," the figure here being nearly £200,000 higher than in June.

Trade Marks

THE following applications have been made for trade marks. Objections may be entered within a month from the date indicated.

August 13th

BYSTANDER. No. 648,621. Class 9. Radio and television receiving sets (complete) and component parts thereof not included in other classes.—H. White, 62, Swan Street, Manchester, 4.

INTERTHERM. No. 647,134. Class 10. Medical diathermic apparatus and appliances.—Stanley Cox, Ltd., 11, Gerrard Street, London, W.1.

August 20th

ROTOFLEX. No. 649,440, Class 7. Electric scaling hammers, and parts thereof not included in other classes.—Electric Scaling Hammers, Ltd., Grosvenor Gardens House, Grosvenor Gardens, London, S.W.1.

BIRLEC (design). No. 647,866, Class 7. Belt conveying machines, loading and unloading machines, and engines and motors for operating such machines; parts included in Class 7, of the aforesaid goods; machine-driving belts and conveyor belts. Also No. 647,867, Class 11. Installations and apparatus for heating, refrigerating, drying and ventilating, etc., but not including domestic refrigerators, hair-dryers and electric fans.—Birlec, Ltd., Tyburn Road, Erdington, Birmingham.

HUBEX. No. 645,884, Class 9. Electrical apparatus and instruments included in Class 9; scientific, nautical and surveying instruments and apparatus, and photographic instruments.—J. J. Huber, 22, Philpot Lane, London, E.C.3.

FEROGLOZ. No. 649,033, Class 9. Electric cables.—Ward & Goldstone, Ltd., Sampson Works, Frederick Road, Pendleton, Manchester.

TOWER. No. 649,401, Class 9. Electric batteries.—Lancashire Batteries, Ltd., 1, Chancery Place, Manchester, 2.

CLAMPION. No. B647,357, Class 11. Table lamps.—Forson Design & Engineering Co., Ltd. West Street, Portslade-by-Sea, Sussex.

STRATA. No. 647,794, Class 11. Electric heating apparatus and electric lamps (not for medical or surgical purposes).—H. Skidmore, A. Phillips and B. Buckley, trading as Strata Engineering Co., 31, Crossbank Street, Oldham.

ELECTRICITY SUPPLY

New Clitheroe Station. Big Canadian Scheme.

Brighton.—TRANSPORT SUPPLY.—A scheme has been approved for giving an electricity supply for the extension of the trolley-bus system from Preston Drove to Carden Avenue including the provision of a mercury arc rectifier substation, at an estimated cost of £8,220.

HOUSING AND FACTORY SCHEMES.—Supplies of electricity to approximately 750 dwellings and 11 factories on the Lower Bevenden Housing estate, will involve the laying of l.v. distributing mains and the provision of five substations, with h.v. feeder connections. The estimated cost of the complete scheme is £36,335. A brick-built substation, costing £570 is to be erected to supply the Sunninghill Housing estate.

Clitheroe.—POWER STATION SITE SOUGHT.—The Electricity Board is inquiring as to availability of power station sites.

Dartford.—SUBSTATIONS.—The Corporation has received consent to borrow £4,681 for the provision and installation of kiosks and substation equipment necessary to meet increased demands.

Douglas (I.O.M.).—SUPPLY TO HOUSES.—Mains are to be laid off Princes Road to supply electricity to new houses (£241).

Glasgow.—ELECTRICAL INSTALLATIONS.—The Corporation is to install electric heating apparatus and improve the lighting of huts at the Seaforth Residential School at an estimated cost of £732. Transformer houses are to be provided at the Riverside Senior Secondary and Wellshot Junior Secondary Schools, in connection with the supply of electricity to prefabricated huts, used as classrooms (£300 each school). The Electricity Department is to overhaul the electrical installations at Craig House, Kilmarnock (£1,992) and carry out repairs and renewals on the electrical installation at Foresthall at an estimated cost of £5,120.

North West Midlands.—OPENING OF MEAFORD STATION.—The Minister of Fuel and Power is to open the North West Midlands Joint Electricity Authority's new generating station at Meaford, Staffordshire, on October 20th.

Poplar.—INSTALLATION IN FLATS.—The Electricity Department is to undertake the electrical installations at forty-eight flats being constructed in Abbott Road (£2,650).

Richmond (Yorks).—"COMING OF AGE."—The Corporation Electricity Committee is to hold a special meeting on October 27th to commemorate the twenty-first birthday of the electricity undertaking. Alderman A. Brand has been chairman of the Committee since it was formed.

Scarborough. — REVISED CHARGES. — The following revised electricity charges have been approved by the Town Council:—Lighting, ordinary rate, 5d. per kWh plus 12½ per cent. Motive power: First 500 kWh per quarter 2½d. per kWh; next 2,000 kWh 1¾d.; next 2,500 kWh 1½d.; next 5,000 kWh, 1¼d.; and over 10,000 kWh, 1d. The new motive power rate will apply in place of the existing ordinary flat rate for power and the power contract rate. Prepayment meter consumers will pay an extra ½d. per kWh. Outer area consumers will pay another 10 per cent on the above rates.

Worthing.—RURAL EXTENSION.—The Corporation is seeking approval of an arrangement with the Sussex Electricity Supply Co., Ltd., for the supply of electricity to the rural area west of Worthing. The cost of providing the necessary cables to connect to the company's high-voltage cable in Littlehampton, and for the necessary switchgear, would be about £4,000.

Overseas

Canada.—NEW HYDRO-ELECTRIC SCHEME.—The Ontario Hydro-Electric Power Commission is to commence the construction immediately of a new 160,000-h.p. development at Cheneaux on the Ottawa River. It will cost $20,000,000. The Commission now has in hand six projects which, when completed, will increase its generating capacity to 900,000 h.p., or by 50 per cent. Since the end of the war the demand for power has risen by 25 per cent and is still increasing.

U.S. POWER FOR BRITISH COLUMBIA. — *Electrical News and Engineering* recently reported that the power was soon to be turned on over the Bonneville Dam to Vancouver transmission link to provide American power to British Columbia while the Bridge River plant is under construction. A 33,000-kVA transformer is being used to connect the 69-kV B.C. Electric primary system to the Bonneville 230-kV line and a second transformer (25,000 kVA) has been authorized to increase the power transfer. Demand for power in British Columbia is increasing so rapidly that approval has been given to the installation of the second 62,000-h.p. set at Bridge River.

South Africa.—EXTENSIONS IN JOHANNESBURG SUBURBS.—A large expansion of the Electricity Department's distribution system has been planned for the suburbs of Johannesburg, and extensions are being made to the Orlando power stations. At present the city station has a capacity of about 130,000 kW and the Orlando stations 90,000 kW. Two additional sets totally 60,000 kW have been ordered from Britain, and it is hoped that they will be available in 1950.—*Reuter* (Johannesburg).

NEW BOOKS

American Textbook. Heat Treatment of Metals.

Electricity, Principles, Practice and Experiments. By C. S. Siskind, M.S.E.E. Pp. 448; figs. 189; index. McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 13s.

This book states in its preface that it is for use in senior high schools and junior colleges. This must be taken in the American meaning of these terms. In this country we would call it a semi-popular book for apprentices in electrical works and those just beginning to attend evening classes. The mathematical treatment is limited to the simplest arithmetical and algebraic operations and in spite of the fact that treatment of alternating currents and a.c. motors is dealt with, no trigonometry is used and there is no proper explanation of "lead" or "lag" from any vector point of view. It is admitted that no attempt has been made to derive formulæ quoted and there has been no careful definition of fundamental units, such as the electromagnetic unit of current and its relation to the ampere.

These points seem to us serious defects against the use of the book as a class textbook in this country, but within the purpose for which it was devised it is clearly written and properly illustrated. Some slight confusion would occur owing to the use of American phraseology; for instance what we would call "squirrel cage motors" they prefer to call "induction motors." Though both terms are used, we reserve the latter for a different type. A large number of examples are included, but it is suggested that the provision of answers would help. It is stated that films can be had to accompany the text.—W.C.A.

Metal Working and Heat-Treatment Manual, Vol. II. By F. Johnson, D.Sc. Pp. 226; figs. 74; index. Paul Elek Publishers, Ltd., 38, Hatton Garden, London, E.C.1. Price 17s. 6d.

This book is the second volume of a series of four, the scope of the series being the entire range of the heat-treatment of metals. The first volume dealt almost exclusively with the heat-treatment of carbon-steels and the mechanical testing of metals, while the forthcoming volumes, III and IV, will deal successively with surface-hardening processes and furnaces and pyrometry.

Dr. Johnson is head of the Department of Metallurgy in the Central Technical College, Birmingham. Attention is called in this book to two events of "profound significance to present and future generations of metallurgical students" which have recently occurred, viz.: (*a*) the establishment of a new British National Certificate scheme for Metallurgy and (*b*) the birth of a British Institution of Metallurgists. In the preparation of this series the author has kept these events in view.

This book is well printed on good quality paper and is profusely illustrated with very clear diagrams. Some idea of the ground covered is obtained from the fact that 113 tables are included in the text. There can hardly be any aspect of the scope of problems covered by the title, to which metallurgists will not find some useful reference and this raises the question whether the range is not greater than can be satisfactorily dealt with in a treatise of 226 pages which is intended to serve as a textbook for examination purposes.

When preparing a new edition, the author may like to consider the possibility of including numerical examples. There is an immense amount of exact information in this book, but in many cases it is given in a too concentrated form. It would also add considerably to the utility and interest of the treatise if, for example, some technical data relating to electric-arc furnaces, and high-frequency furnaces were given, such as circuit connections and other simple characteristic features. The line diagrams of these furnaces which are given do not convey much information. The author, no doubt, will deal more fully in Volume IV with this subject; nevertheless it would form a valuable feature if this additional matter were to be included in the present volume.—T.F.W.

Television Simplified. By Milton S. Kiver. Pp. 375; figs. 222; index. Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2. Price 27s.

This book is intended for those who are familiar with sound receivers, but are beginners in television. It gives clear and non-mathematical explanations of the operation of the circuits special to television and of those more ordinary circuits which differ in degree, but not in kind, from the ones used in sound equipment.

To the British reader the value of the book is lessened in some degree by the examples being all taken from American practice, which in some respects differs quite considerably from the British. However, much of the material applies equally to both.

Starting with general principles, the book covers all the special circuits of television and concludes with chapters on colour television and frequency modulation. The descriptions of the ways in which the circuits function are clear and will certainly help the beginner. The treatment of deflecting systems is over-simplified as the experimenter will soon find out.

Errors are few, but there are some. There is a chapter on complete receivers which includes full circuit diagrams.—W.T.C.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Telephone Manufacturing Co., Ltd.—Mr. Fred T. Jackson, the chairman and managing director, stated at the annual general meeting on Monday that the change-over from war work presented them with difficulties which could not be foreseen. The material supply situation had been, and still was, one that caused very great anxiety. There was far too much material being used in non-essential manufacture to the detriment of the country's effort in export and home trade. In his opinion both the high costs of raw material and the shortage were due to the Government's policy of bulk buying. Their only hope was that the Government would recognize its mistakes and allow private enterprise unfettered freedom. Given this freedom the company was in a good position. They had a good order book amounting to over £1,800,000 at June 30th and prospects over the next few years were excellent, especially if the supply of raw materials became more plentiful.

Thomas De La Rue, Ltd.—The decline of £28,588 in the net profit last year was offset by the smaller amount that had to be provided for taxation. Pointing this out at the annual general meeting Mr. B. C. Westall, the chairman and managing director, explained that the diminution of profits of the parent company was due in considerable measure to the effect of the power cut on output last winter and to some extent to the consequent shortage of raw materials. Since the close of the year the output of the factories had increased and at present all of them were working to capacity. Unless they had to face a worse position next winter than last, there was every reason to believe that the results of the current year would show a substantial improvement. Further additions had been made to the plant during the year. The Rangoon factory was now being re-equipped and production would commence in three or four months' time. The building of the West Chirton factory at Tynemouth of the De La Rue Insulation Co. was now complete.

A. Reyrolle & Co., Ltd.—Shareholders have approved resolutions to cancel shares which have not been issued or taken up and to increase the capital of the company from £1,250,000 to £2,000,000. The directors pointed out that during the past eighteen months they have acquired on favourable terms a considerable proportion of the buildings, plant and equipment provided during the war by Government departments, and also machine tools, etc. The volume of work is now at record height and this together with the increase in costs means that the company has to finance a much greater value of work in progress and is approaching the limit of its borrowing powers. They are applying to the Capital Issues Committee for authorization to make an issue of preference capital.

Revo Electric Co., Ltd.—Speaking at the annual general meeting on August 21st Mr. Bertram Silcock, the chairman, said that the demand on the company's fittings section had increased this year and new and important developments had taken place in the field of fluorescent lighting equipment. An entirely new technique in the design of street lighting lanterns, embodying fluorescent tubes, was rapidly gaining favour on account of the saving in current consumption and increased visibility. A new streamlined cooker, a kettle, a thermostatically-controlled iron and several new fires for export had also been introduced. They had had a record year as regarded production and earnings, their factory was now capable of further increasing production and their order books were full.

The Hackbridge & Hewittic Electric Co., Ltd. (the amalgamation of the Hewittic Electric Co., the Hackbridge Electric Construction Co., and the New Switchgear Construction Co.), announces a trading profit of £94,010 for the year ended March 31st last. After providing for depreciation, directors' fees and taxation, and allocating £10,000 to general reserve, it is proposed to pay an ordinary dividend of 6 per cent and to carry forward £2,363. It is proposed to convert the ordinary shares into 5s. stock units.

Thorn Electrical Industries, Ltd.—After providing £50,000 (against £34,000) for taxation, the combined profit for the year ended March 31st was £42,876 (£27,742). The ordinary dividend is increased from 20 to 25 per cent and general reserve again receives £15,000.

The East African Power & Lighting Co., Ltd., is paying a final dividend of 4 per cent, maintaining the distribution for the year at 7 per cent.

The North Eastern Electric Supply Co., Ltd., is again paying an interim dividend of 2½ per cent.

The West London & Provincial Electric & General Trust, Ltd., has declared an interim dividend of 2 per cent (unchanged).

The Clyde Valley Electrical Power Co. is paying an interim dividend of 3 per cent (same).

New Companies

Dale Electric (Yorkshire), Ltd.—Registered August 14th. Capital, £10,000. Electrical engineers and general installation contractors, etc. Directors: L. H. Dale and P. Coomer. Regd. office: Electricity Buildings, Filey.

Kenfig Hill and District Radio Relays, Ltd.—Registered August 14th. Capital, £1,000. Directors: S. Waters and Mrs. Frances M.

Waters. Regd. office: Radio Relay Station, Kenfig Hill, Glam.

Prytherch, Colenso-Jones & Co., Ltd.—Registered August 13th. Capital, £1,000. Electrical engineers and general electrical installation contractors, etc. Directors: T. I. Prytherch, E. V. J. Prytherch, T. D. Prytherch and Kingsley Colenso-Jones. Regd. office: 38, Richard Street, Cilfynydd, Pontypridd.

Lance of Llandudno, Ltd.—Registered August 13th. Capital, £5,000. Electrical and wireless engineers, etc. Directors: Ann J. Lance, E. G. Lance, Winifred J. Rimmer and D. Pritchard. Regd. office: 23, Mostyn Street, Llandudno.

Radio Heaters, Ltd.—Registered August 13th. Capital £100. Manufacturers of, and dealers in, electrical, electronic and other heating and other appliances for use in the plastic, rubber and allied industries and other purposes, etc. Subscribers: J. F. Cullingham and H. C. Bunn. Regd. office: 42, Bedford Avenue, W.C.1.

Supreme Electrical (Hampstead), Ltd.—Registered August 12th. Capital, £100. Electrical engineers and contractors, etc. Directors: W. Flynn and O. M. Dods. Regd. office: 6, Broad Street Place, E.C.2.

General Products (Electrical), Ltd.—Registered August 12th. Capital, £5,000. Designers and manufacturers of radio, television, telephone and electrical apparatus, etc. Directors: L. B. Byron and D. M. Gunn. Regd. office: Thorburn Street, Upper Brook Street, Manchester, 13.

James McGrath, Ltd.—Registered in Edinburgh August 12th. Capital, £5,000. To acquire the business of James McGrath, battery manufacturer, Elderslie. Directors: J. McGrath and R. Catterson. Secretary: J. McGrath. Regd. office: 148/150, Main Street, Elderslie, Renfrewshire.

Welstock Engineering Co., Ltd.—Registered August 19th. Capital, £1,000. Electrical, mechanical, radio, telephonic and telegraphic engineers, etc. Subscribers: A. W. Stockwell and T. E. Weldon. Secretary: T. E. Weldon Regd. office: 48, Gresham Street, E.C.2.

Increases of Capital

Stratit, Ltd.—Increased by £9,900, in £1 shares, beyond the registered capital of £9,900.

Engineering Service Installations, Ltd.—Increased by £24,900, in £1 ordinary shares, beyond the registered capital of £100.

G. P. Dennis, Ltd.—Increased by £5,000, in £1 ordinary shares, beyond the registered capital of £5,000.

Zelco, Ltd.—Increased by £4,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Suflex, Ltd.—Increased by £17,000, in 340,000 ordinary shares of 1s., beyond the registered capital of £3,000.

Hardman & Co., Ltd.—Increased by £19,500, in £1 ordinary shares, beyond the registered capital of £500.

D. & F. Electrical Stores, Ltd.—Increased by £8,800, in 3,800 ordinary and 5,000 5 per cent cumulative preference shares of £1, beyond the registered capital of £1,200.

Associated Electronic Engineers, Ltd.—Increased by £7,000, in £2,000 redeemable preference and 5,000 ordinary shares of £1, beyond the registered capital of £3,000.

Metronic Instrument Co., Ltd.—Increased by £4,000, in £1 shares, beyond the registered capital of £500.

Liquidations

Cleveland Electrical Co., Ltd.—(Members' voluntary winding-up). General meeting of members September 22nd at 46a, Finsbury Square, London, E.C.2, to hear an account of the winding-up from the liquidator, Mr. L. Grahame.

Bankruptcies

C. Peacock, 93, Lowther Street, and 51, Gillygate, York, electrical engineer.—Last day for receiving proofs for dividend September 3rd. Trustee, Mr. J. S. Snowball, Lantern Tower Chambers, Coppergate, York.

J. H. Keene, trading as Bush Tool & Supply, 38, Fairlawn Avenue, Chiswick, W.4, and at Acton, electrical manufacturer.—Receiving order made August 14th on debtor's own petition. First meeting September 3rd at 20, Eaton Place, S.W.1. Public examination October 10th at the Court House, Half Acre, Brentford.

Milk Testing by Fluorescent Lighting

MILK being one of the most important of our home-produced foods, it is essential that every care is taken to ensure its purity. For this purpose the National Milk Testing and Advisory Scheme, involving the use of the resazurin test, has been adopted. Resazurin is very sensitive to light and while it has to be protected from direct sunlight, a good source of north light must be available. The Leeds Laboratory of the National Milk Testing Service found that the variable nature of the daylight available was unsatisfactory so "Metrovick" illuminating engineers were consulted and installed "daylight" fluorescent tubular lighting throughout the laboratory. This has been entirely successful in providing a constant light source very much akin to natural north light. The actual test requires the addition of a small quantity of resazurin to a sample of milk in a test tube, subjecting it to incubation at blood heat and then comparing it with an untreated milk sample in a specially designed comparator. Contaminated milk samples take on different colourings as a result of the bacterial growth and to detect the actual degree of colorization it is essential that the comparator is held so that a good source of light falls directly on to the test tubes.

STOCKS AND SHARES

"ECONOMIC crisis" is the conspicuous factor which governs practically all the markets of the Stock Exchange, from British Government securities to West African mines. Hardly anything escaped from a depression which at times threatened to develop into a severe slump. From the worst prices, there was a sharp recovery, Consols, for instance, rising from 80 to 85½ within a few days. This affected the sentiment of markets as a whole, though prices were slow to respond to the convalescence of Consols. The selling is better, to quote a Stock Exchange saying, than the buying. Prospective purchasers have been heard, however, to complain that when they come to buy the stocks and shares which they would like to pick up at last week's lowest prices, they are met with the polite reply that other buyers are in the field, and that sellers are not giving away their securities even yet.

The Ebbing Tide

The monthly price lists which accompany this column bear marks of the worst relapse suffered by Stock Exchange markets since the long ascent began in 1940. Among the most conspicuous of the month's changes in the electrical equipment market are losses of £1 in Electric Constructions, to 50s., and of 22s. 6d. in Lancashire Dynamo at 5⅛. In Tube Investments, now 6$\frac{5}{16}$, the decline amounts to 18s. 9d. Losses of 10s. or more are shown by G.E.C., General Cables, English Electric, Chloride Electric, Reyrolles and Johnson & Phillips. Deccas at 37s. 6d. are 16s. 3d. down, De la Rue 15s., at 45s. A.E.I., B.I.C., Plesseys, Every Ready, Revo and Walsall Conduits have all shed at least 5s. Few others have escaped depreciation more or less serious in extent, but notable steadiness has been displayed by C. A. Parsons at 76s. and Aron Meters at 55s.

Equipment and Manufacturing

Shares of the leading cable manufacturers have an established reputation as investment stocks of the soundest character, and the yields of around 4¼ per cent, on, for instance, Henley's and Johnson & Phillips can be taken as representative of the level to which the prices of securities in that class have been adjusted. It is noteworthy that Enfields yield under 3¾ per cent, and B.I.C. less than 3½ per cent, indicating that the market propensity for anticipation remains active. In other sections of the electrical market, A.E.I. and English Electrics remain well under the 4 per cent yield mark, but General Electrics are just over the line and Crompton Parkinsons ¼ per cent above it. In the 5 per cent category are Ever Ready, Allen West and Walsall Conduits. On many of the radio shares, with exceptions in the cases of E.M.I. and Deccas, yields have gone to 5 per cent upwards.

Miscellaneous Movements

In contrast with the devastation in other areas are the modest declines, which seldom exceed 6d. to 1s., in a number of home electricity supply issues. In railway stocks, and others due for nationalization, the damage has been similarly limited, although Central Electricity stocks have been marked down heavily. Babcock & Wilcox have lost 11s. 6d. on the month, to 65s., Hopkinsons 17s. 6d. to 4⅞, and Murex 13s. 9d. to 82s. 6d. British Electric Traction deferred at 1145, shed no less than 240 points, and Tillings are 9s. lower at 58s. Both the Cable & Wireless stocks have lost ground, as have Globe Telegraphs at 38s. 9d. Conditions among fixed-interest stocks are exemplified by declines in A.E.I. 8 per cent preference from 46s. 3d. to 38s. 9d., and Anglo-American Telegraph 6 per cent preferred, from 143 to 127½.

Ericsson Success

Ericsson Telephones last week offered 3½ per cent debenture stock at 100 and in view of the conditions prevailing at the time the prospectus appeared, doubt was expressed as to whether the underwriters might not be left with a proportion of the stock. As it happened, the market and the political atmosphere cleared a little at the time the subscription list opened, with the result that the amount was oversubscribed. Had it been made on the originally-proposed basis of 3¼ per cent, applications from the public would probably not have reached the full amount. The price of the ordinary shares, 42s. 6d., is 5s. down on the month.

Globe Telegraph and Trust

Sir Edward Wilshaw stated at this company's annual meeting that the interest in Cable & Wireless (Holding) accounts for about 40 per cent, at book cost, of the investments, and for 60 per cent of the income. This explains, of course, the habit of the shares to follow closely the prices of Cable & Wireless stocks, which, in turn, are swayed by considerations about the amount of compensation to be paid by the Government for the operating companies. Arbitration to settle this figure is not expected to take place, Sir Edward says, before the beginning of next year. On the 5 per cent tax free dividend, Globe ordinary at 38s. 9d. yield £2 11s. 6d. per cent net, which is equivalent to nearly 4¾ per cent less tax at 9s. In present market conditions, it is reassuring to note that the value of the company's investments at the date of the balance sheet showed an appreciation of more than £3½ million over the book cost.

Telephone Waiting Lists

At the annual meeting of Telephone Properties, Ltd., held on Tuesday last week, the chairman, Sir Alexander Roger, stated that the demand for telephone service in Venezuela, where the company operates, con-

(*Continued on page* 339)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Est. Comp.*	Last Div.	Middle Price Aug. 22	Month's Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	66/8	12½	61/–	–2/–	4 2 0
British Power and Light	37/10	8	34/6	–1/–	4 14 2
City of London ..	34/4	7	31/3	–1/3	4 9 7
Clyde Valley ..	46/5	8	42/6	–1/–	3 15 3
County of London	49/5	10	45/6	–1/–	4 8 0
Edmundons ..	31/6	6	29/–	–6d.	4 2 9
Elec. Dis. Yorkshire	51/–	9	46/6	–1/6	3 17 4
Elec. Fin. and Securities ..	67/–	15	62/–	–1/6	4 16 9
Elec. Supply Corporation ..	50/8	10	46/–	–2/–	4 7 0
Lancs. Light and Power ..	37/7	7½	34/6	–1/–	4 7 0
Llanelly Elec. ..	29/1	6	26/6	–6d.	4 10 7
Lond. Assoc. Electric	29/6	6	27/–	–1/–	4 9 0
London Electric	31/4	6	29/–	–6d.	4 2 9
Metropolitan E.S.	48/–	9	44/–	–1/–	4 1 10
Midland Counties	51/5	8	47/–	–1/–	3 7 6
Mid. Elec. Power	47/–	9	43/–	–1/6	4 3 9
Newcastle Elec...	32/7	7	30/–	–6d.	4 13 4
North Eastern Elec.	36/6	7	34/–	–6d.	4 3 4
Northampton ..	50/11	10	47/–	–1/3	4 5 0
Northmet Power.	48/2	9	44/–	–1/6	4 1 10
Scottish Power ..	46/1	9	42/–	–1/6	4 5 9
Southern Areas ..	24/–	5½	23/–	..	4 15 7
South London ..	33/–	7	31/6	..	4 9 0
Yorkshire Elec...	50/10	9	46/6	–1/6	3 17 4

Company	Dividend Previous	Dividend Last	Middle Price Aug. 22	Month's Rise or Fall	Yield p.c.
Public Boards					
Central Electricity:					
1963–93 ..	3½	3½	101½	–8	3 9 0
1974–94 ..	3½	3½	100½	–7	3 4 6
London Elec. Trans.	2½	2½	94½	–6½	2 13 0
Lond. Pass. Trans. Bd.					
A	4½	4½	122½	–2	3 13 6
B	5	5	117½	–2	4 5 1
C	3	3	60½	–1	4 17 7
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	12/9	–1/–	—
Calcutta Elec. ..	6†	6†	41/3	–⅛	2 18 4
Cawnpore Elec...	13	13	55/–	–⅛	4 14 6
East African Power	7	7	46/6	–1/–	3 0 4
Jerusalem Elec...	5	6	25/6	+1/–	4 14 0
Madras Elec. ..	6	8	42/–	–4/–	3 16 2
Nigerian Elec. ..	10	12½	47/6	–⅛	5 5 3
Palestine Elec. "A"	6†	7†	38/–	+6d.	3 13 9
Perak Hydro-elec.	6	7	12/6	–3/6	—
Tokyo Elec. 6% .	—	—	60½	–4	—
Victoria Falls Power	15	19	5⅛	–⅛	3 7 7
Whitehall Inv. Pref.—		6	26/–	–1/6	4 12 3
Equipment and Manufacturing					
Aron Elec. Ord...	10	15	55/–	..	5 9 1
Assoc. Brit. Eng.	8	12	47/6	..	5 1 1

Company	Dividend Previous	Dividend Last	Middle Price Aug. 22	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
Assoc. Elec.:					
Ord.	10	15	77/–	–16/–	3 18 0
Pref.	8	8	38/9	–7/6	4 2 8
Automatic Tel. & El.	12½	12½	58/–	–12/–	4 4 9
Babcock & Wilcox	12½	15	65/–	–11/6	4 12 4
Baldwin, H.J. (2/–)	10	20	10/–	–1/6	4 0 0
British Aluminium	8	10	42/6	–8/–	4 12 7
B.I. Callender's..	—	6¾	39/3	–6/3	3 8 6
British Rola (2/–)	15	15	4/3	–1/–	7 1 2
British Thermostat (5/–)	18½	23½	26/3	–1/3	4 9 6
British Vac. Cleaner (5/–)	30	20	18/3	–3/–	6 3 0
Brush Ord. (5/–)..	10	4	6/3	–1/6	3 4 0
Burco (5/–) ..	20	35	25/9	–⅛	6 18 0
Chloride El. Storage	20	20	97/6	–12/6	4 2 0
Christy Bros. ..	17½	17½	75/–	–6/3	4 13 4
Cole, E. K. (5/–)	20	20	17/6	–6/–	5 14 3
Cossor, A. C. (5/–)	12½†	25†	20/6	–½	6 2 0
Crabtree (10/–) ..	17½	17½	41/3	–4/9	4 5 0
Crompton Parkinson Ord. (5/–) ..	22½	22½	26/–	–4/6	4 6 7
De La Rue (5/–)	45	50	45/–	–15/–	5 11 3
Decca (1/–) ..	100	112½	37/6	–16/3	3 0 0
E.M.I. (10/–) ..	8	8	20/6	–4/–	3 18 1
Elec. Construction	12½	12½	50/–	–20/–	5 0 0
Enfield Cable Ord.	12½	7½	40/9	–4/9	3 13 6
English Electric .	10	10	53/3	–11/3	3 15 2
Ericsson Tel. (5/–)	20†	20†	42/6	–5/–	2 7 2
Ever Ready (5/–)	40	40	37/6	–5/–	5 6 8
Falk Stadelmann	7½	10	43/9	–4/6	4 11 4
Ferranti Pref. ..	7	7	33/9	–3/3	4 3 10
G.E.C. Pref.	6½	6½	33/3	–5/–	3 18 4
Ord.	17½	17½	85/–	–11/3	4 2 5
General Cable (5/–)	15	25	42/6	–10/–	—
Greenwood & Batley	15	15	50/–	–7/6	6 0 0
H.T.A. (10/–) ..	10	10	17/6	–1/6	5 14 3
Heatrae (2/–) ..	12½	12½	6/3	..	4 0 0
Henley's (5/–) ..	20	20	23/6	–3/6	4 5 1
4½% Pref. ..	4½	4½	24/6	–2/–	3 13 7
Hopkinsons ..	20	22½	4⅞	–⅛	4 12 4
Intl. Combustion (5/–)	32½	37½	43/9	–11/3	4 6 0
Johnson & Phillips	15	15	67/6	–11/3	4 9 3
Lancashire Dynamo	22½	22½	5½	–1½	4 8 0
Laurence, Scott (5/–)	12½	12½	11/–	–2/6	5 13 8
London Elec. Wire	7½	10	45/9	+5/3	4 7 4
Mather & Platt ..	10	11	48/–	–7/–	4 11 8
Metal Industries (B)	9	10	45/–	–12/6	4 9 1
Mid. Elec. Mfg. ..	30	35	8½	–⅜	3 18 9
Murex	20	20	82/6	–13/9	4 17 1
Newman Ind. (2/–)	22½	22½	7/–	–1/3	6 8 7
Plessey (5/–) ..	20	30	25/–	–6/–	—
Parsons C. A. ..	—	12½	76/–	..	3 5 9
Pye Deferred (5/–)	25	25	27/6	–7/6	5 11 0
Radio & Tel. (2/–)	25	40	5/6	–1/–	—
Revo (10/–) ..	17½	20	50/–	–5/–	4 0 0
Reyrolle ..	12½	12½	70/–	–13/9	3 11 5
Scophony (5/–) ..	—	—	5/–	..	—

(*Continued on page* 339)

* Proposed amount of British Electricity Stock to be allotted.
† Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Aug. 22	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
Siemens Ord. ..	7½	7½	31/–	–4/6	4 16 9
Strand Elec. (5/–)	12½	12½	10/3	–2/6	6 2 0
Switchgear&Cowans (5/–) ..	25	10	16/9	–2/3	2 19 8
T.C.C. (10/–) ..	12½	15	33/9	–2/6	4 8 9
T.C. & M. ..	10	10	46/3	–6/3	4 6 7
Telephone Mfg.(5/–)	9	9	10/9	–2/9	4 3 9
Thorn Elec. (5/–)	20	20	29/6	–6/9	5 2 7
Tube Investments	22½	22½	6⅞	–1⅛	3 11 8
Vactric (5/–) ..	Nil	Nil	11/6	–5/6	—
Veritys (5/–) ..	7½	2½	5/–	–2/–	2 10 0
WalsallConduits(4/–)	55	70	55/9	+6/9	5 0 10
Ward & Goldstone (5/–)	35	50	66/–	..	—
Watford (2/–) ..	15	15	6/3	–1/–	4 16 0
WestinghouseBrake	14	14	66/3	–5/–	4 6 5
West, Allen (5/–)	7½	10	9/9	–9d.	5 2 7
Traction and Transport					
Brit.Elec.Traction:					
Def. Ord. ..	45	50	1145	–240	4 7 5
Pref. Ord. ..	8	8	175	–20	4 11 5
Calcutta Trams..	6½	7½	37/6	–7/6	4 0 0
Cape Elec. Trams	5	6	32/6	–2/6	3 13 10

Company	Dividend Previous	Dividend Last	Middle Price Aug. 22	Month's Rise or Fall	Yield p.c.
Traction and Transport (*Continued*)					£ s. d.
Southern Rly.:					
5% Prefd. ..	5	5	71½	..	6 19 10
5% Pref. ..	5	5	114½	–4	4 7 5
T. Tilling ..	10	10	58/–	–9/–	3 9 0
West Riding ..	10	12	53/6	–6/–	5 12 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	127½	–15½	4 14 0
Def.	1½	1½	27½	–6½	5 9 1
Anglo-Portuguese	8	8	30/–	–1/3	5 6 8
Cable & Wireless:					
5½ Pref. ..	5½	5½	113½	–4	4 17 0
Ord.	4	4	156	–2½	2 11 3
CanadianMarconi	$1 Nil	4 cts.	11/6	–1/–	—
Globe Tel. & Tel.:					
Ord.	8¼†	5††	38/9	–6/3	2 11 6
Pref.	6	6	30/6	–4/–	3 18 7
GreatNorthernTel. (£10)	18	15	31½	–3	4 15 3
Inter. Tel. & Tel.	Nil	Nil	14	–2	—
Marconi-Marine..	7½	7½	30/–	–2/–	5 0 0
Oriental Tel. Ord.	4	4	47/6	–6/3	—
Telephone Props.	6	6	21/6	..	5 11 7
Tele. Rentals (5/–)	10	10	10/6	–2/6	4 15 3

† Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from p.* 337)

tinues to grow and to outstrip all new additions. "Administrations in every country," he added, "are faced with the same problem. For example, the U.S.A. has a waiting list of 2,000,000 and Great Britain 400,000. The demand all over the world," he said, "for telecommunication equipment, notwithstanding the growing output of the manufacturers since the end of the war, is increasing rather than diminishing." He went on to say that competition from every class of industry in every industrial country for raw material is intense, and is complicated by the fact that there is not enough raw material to meet the demand.

The Buyer's Market

The demand for telephone facilities and apparatus, says Sir Alexander Roger, is world-wide, and only the conditions prevailing in industry are likely to impose limitation upon expansion of all companies connected with this branch. The fall in Automatic Telephone shares over the past month, from 70s. to 58s., affords a return of £4 4s. 9d. per cent on the basis of the last-paid 12½ per cent dividend, the yield comparing with £3 11s. 6d. which the previous price of 70s. offered. Telephone & General Trust ordinary shares have come down from 45s. to 38s. and in them also there is scope for recovery as soon as markets settle down into less nervous conditions. Telephone Manufacturing shares have given way from 15s. to the present price of 10s. 9d., at which the return is £4 3s. 9d. and Telegraph Constructions, which were over 60s. not long ago, can now be bought at 46s. 3d. to pay £4 6s. 7d.

Yields on Industrials

Apart from the uncertainties connected with the immediate future of industrial conditions, the fall of gilt-edged securities to a 3 per cent basis would by itself have caused a general upward revision of the return which investment expects from industrial ordinary shares. A month or so ago, with Government stocks paying no more than 2½ per cent, buyers of industrials were prepared to accept a 3½ to 4 per cent return on their money from the dividends paid currently by the leading undertakings. During the slump, the ratio between gilt-edged and industrial yields has been roughly maintained, with the result that 4 per cent—or rather more—is now about the average return available from first-class equities. The ratio has, however, widened against shares connected with industries of a character not regarded as essential to the needs of the hour.

Instrument Engineering

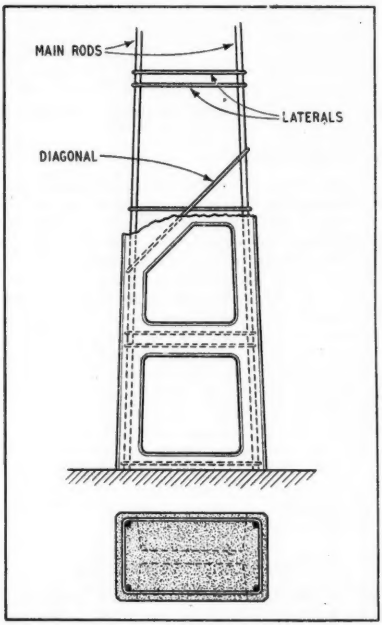
A NEW journal of instrument engineering entitled "Muirhead Technique" has been inaugurated for circulation mainly to users of equipment manufactured by Muirhead & Co., Ltd. The second issue of Vol. I, which is dated April, 1947, is devoted to a description of "Magslips" for controlling and actuating distant mechanisms, and their use for focusing American-built "Technicolor" motion picture cameras and projectors.

Power-Line Poles

Use of Reinforced Concrete Type

MANUFACTURERS of reinforced concrete poles for overhead power lines are receiving encouraging demands for their products because of the prevailing scarcity of wood poles, which is likely to persist indefinitely, as well as the increasing difficulty of securing steel required for mast building.

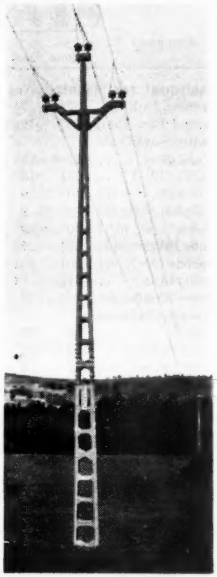
The principal objection to the use of reinforced concrete is its weight which makes handling difficult in transport and erection. Against this there is the considerable advantage that concrete poles are designed precisely for the working loads they are intended to bear and that, once erected, they cost very little to maintain throughout their long serviceable life. Once an electricity distributing organization accepts the fact that it has heavier poles to deal with, procedure can be established to avoid difficulties during the positioning of line poles.



Method of reinforcing concrete pole

Manufacturing facilities have been limited, but Concrete Utilities, Ltd., have accumulated steel moulds which enable a good rate of production to be achieved.

At present the company is concentrating on the making of three main types: Class "X" for a working load of 250 lb; Class "Y" for 500 lb; and Class "Z" for 1,000 lb, all of any height required up to 47 ft overall and standardized with a 2·5 safety factor allowance. Other loadings can be catered for. The detail sketch indicates the method of reinforcement, both lateral and diagonal members being electrically welded to the main upright rods.



Typical pole with concrete brackets

The steel reinforcement imparts to concrete poles a remarkable degree of flexibility. A Class "Y" pole designed to withstand a maximum working load of 1,250 lb will deflect under gradually increasing test load to just over 11 in. before failing at 1,344 lb, subsequently applied.

The photograph illustrates one pole of a line, originally supplied through Johnson & Phillips, Ltd., which has been in regular service for some years near Kendal, Westmorland. In this particular case the line brackets are also made of concrete, which is optional, since the customer can have plain poles holed to suit his individual requirements for fitting conductor brackets of his own choice.

This company produces concrete poles of many kinds for street lighting as well as for transmission lines, which fact undoubtedly helps to build up good productive capacity, since the factory facilities provided for making street posts also assist the construction of overhead line poles.

Specialization has involved the provision of appropriate jigs for reinforcement bending, properly designed moulds for concreting, overhead cranes and materials-handling equipment, without which this class of product, even if soundly designed, cannot be accurately and speedily produced in large quantities. Overhead power line poles are being made at Ware, Liverpool, Ipswich and Cardiff.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1939

BRITISH Electric Meters, Ltd., N. B. Coop and R. T. Brown.—" Time-fuse devices particularly for marine uses, e.g., for smoke-signal and smoke-screen buoys." 19729. July 6th, 1939. (591050.)

1941

E. P. Newton (Telefonaktiebolaget L. M. Ericsson).—" Alarm systems." 15892. December 9th, 1941. (Convention date not granted.) (591097.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and L. W. Houghton. — " High-frequency electrical communication systems." 16265. December 16th, 1941. (591098.)

1942

Standard Telephones & Cables, Ltd., P. K. Chatterjea and L. W. Houghton. — " Radio communication systems." 6194. May 7th, 1942. (591099.)

1943

Holophane, Ltd., and S. English.—" Flame-proof and similar industrial well-glass lighting fittings." 8312. May 25th, 1943. (591100.)

1944

E. P. Schreyer.—" Electric steaming irons." 190. January 5th, 1944. (591136.)

British Thomson-Houston Co., Ltd.—" Electric valve control systems for a.c. circuits." 5234. March 23rd, 1943. (Addition to 588656.) (591052.)

H. G. Booker, C. H. Westcott and R. J. Lees.—" Electromagnetic radiating or receiving apparatus." 5448. March 23rd, 1944. (591053.)

A. C. Cossor, Ltd., L. H. Bedford and L. Jofeh.—" Electrical measuring and calculating apparatus." 10933. June 7th, 1944. (591141.)

J. E. Preston.—" Sequence timer and measuring control." 14953. August 4th, 1944. (591000.)

Electric Construction Co., Ltd., and J. C. Milne.—" Control gear for electric motors." 16430. August 29th, 1944. (591055.)

Ferranti, Ltd., Tootal Broadhurst Lee Co., Ltd., M. K. Taylor and L. C. Nield.—" Apparatus for measuring such physical states of a material as effect the dielectric losses therein." 17903. September 19th, 1944. (Cognate application 17904/44.) (591147.)

Standard Telephones & Cables, Ltd., and A. J. Maddock.—" High-frequency induction heating of metals." 24286. December 5th, 1944. (591150.)

1945

Akt.-Ges. Brown, Boveri & Cie.—" Electrical contact devices." 514. November 15th, 1943. (591152.)

Automatic Telephone & Electric Co., Ltd., P. N. Roseby and C. W. J. Gellatley.—" Electric fires." 3531. February 13th, 1945. (591116.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Phase-shifting circuits." 4522. February 22nd, 1945. (591009.)

Telegraph Condenser Co., Ltd., and N. H. Bentley.—" Tubular casings for electrical condensers or other electrical apparatus." 5148. March 1st, 1945. (591012.)

J. B. Pierce Foundation.—" Electrical connector devices." 6252. June 3rd, 1944. (591066.)

F. B. Dehn (R. Hetherington & Son, Inc.).—" Snap action electric switches." 6771. March 28th, 1945. (591154.)

Westinghouse Electric International Co.—" Method of heat treating compressed carbon bodies, for electrical and like purposes." 7257. July 17th, 1941. (591015.)

Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges et Camargue.—" Devices allowing the measurement and adjustment of the resistance of an electrolysis cell." 8762. April 7th, 1944. (591016.)

T. F. Harle and J. W. Barnes.—" Control systems and gyro-actuated or other electromagnetic signal producing devices for use therein." 10047. April 20th, 1945. (Cognate application 10919/45.) (591022.)

M. C. Goodall and C. S. Wright.—" Ultra-high-frequency circuits." 10098. April 21st, 1945. (591026.)

Metropolitan-Vickers Electrical Co., Ltd., and F. R. Mason.—" Electric motor equipments." 10171. April 23rd, 1945. (591028.)

First Industrial Corporation.—" Electric switch operating mechanism." 10204. September 7th, 1944. (591030.)

R. G. Whitaker, Ltd., and F. T. Gray.—" Washing and dry cleaning machines." 10280. April 24th, 1945. (591031.)

R. Annan and E. J. Fearn.—" Electrical plug and socket connectors." 10309. April 24th, 1945. (591068.)

A. V. Roe & Co., Ltd., and R. F. Taylor.—" Welding electrodes." 10418. April 25th, 1945. (591033.)

Akt.-Ges. E. Haefely & Cie.—" Apparatus for measuring high alternating voltages." 10528. September 1st, 1944. (591073.)

Automatic Telegraph & Radio Transceiver Co., Ltd., and J. H. Smart.—" Telegraph

recording apparatus." 10541. April 26th, 1945. (591075.)

C.A.V., Ltd., and G. Riley.—" Means for suspending electrically or fluid operated portable tools." 10603. April 27th, 1945. (591084.)

J. S. Withers (Webster-Brinkley Co.).—" Electromagnets." 10640. April 27th, 1945. (591040.)

Concordia Electric Safety Lamp Co., Ltd., and J. P. Cornish.—" Fluid-proof electric switches." 10679. April 27th, 1945. (591090.)

Soc. d'Application des Brevets Cotal.—" Electromagnetic clutches and brakes." 10704. January 29th, 1943. (591091.)

Standard Telephones & Cables, Ltd.—" Radio navigation system and method." 10725. May 1st, 1944. (591041.). " Blocking circuits for signal receivers." 10726. March 3rd, 1944. (591164.)

F. B. Dehn (Press Wireless, Inc.).—" Secrecy signalling systems and apparatus." 10729. April 27th, 1945. (591173.)

Automatic Telephone & Electric Co., Ltd., and G. A. Burns.—" Electrical supervisory control systems." 10754. April 28th, 1945. (591043.)

General Electric Co., Ltd., F. H. Brittain and J. Buckingham.—" Crystal contacts for use for example as rectifiers." 10779. April 28th, 1945. (591092.)

A. West & Co., Ltd., and O. T. David.—" Electric motor control gear." 10862. April 30th, 1945. (591179.)

R. Pointout.—" Electric contacts." 10902. January 8th, 1944. (591183.)

J. B. Tucker, J. E. Gaffney and H. Fawke.—" Electric tumbler switches particularly for alternating current." 10936. May 1st, 1945. (591185.)

A. C. Denisoff.—" Electrical measuring systems." 10955. May 1st, 1945. (591187.)

British Thomson-Houston Co., Ltd.—" Infra-red baking ovens." 11006. May 2nd, 1944. (591190.)

L. H. Huckett.—" Mountings for electric strip lamps." 11029. May 1st, 1945. (591191.)

Revo Electric Co., Ltd., and A. E. Felton.—" Electric laundering irons and the like." 11062. May 2nd, 1945. (591196.)

Allmanna Svenska Elektriska Aktiebolaget.—" Arrangement in compressed air-blast electric circuit breakers with an auxiliary arc." 11077. May 11th, 1944. (591199.)

Mallory Metallurgical Products, Ltd.—" Welding electrode cooler." 11097. May 2nd, 1944. (591201.)

Siemens Bros. & Co., Ltd., and R. S. Bone.—" Electromagnetic telephone instruments." 11114. May 2nd, 1945. (591204.)

L. B. Turner and C. S. Wright.—" Apparatus for measuring electrical quantities in ultra-high-frequency circuits." 11186. May 2nd, 1945. (591210.).

British Thomson-Houston Co., Ltd.—" Electric measuring circuits." 11251. (May 4th, 1944. (591093.)

R. B. Canning.—" Joint boxes for electric cables." 20045. August 3rd, 1945. (591127.)

J. B. Tucker, J. E. Gaffney and H. Fawke.—" Electric tumbler switches particularly for alternating current." 21295. August 21st, 1945. (591217.)

1946

Ferranti, Ltd., Tootal Broadhurst Lee Co., Ltd., M. K. Taylor and L. C. Nield.—" Electrical measurement of variation of physical states of materials such as moisture contents thereof." 37235. September 19th, 1944. (Divided out of 591,147.) (591172.)

Secret Patents Re-assigned:

1933

J. Bell and C. V. Drysdale.—" Electric distant control systems." 24554. September 5th, 1933. (Complete specification accepted and patent sealed May 10th, 1935.) (591128.)

1936

R. A. W. Watt.—" Wireless systems." 25133. September 15th, 1936. (Complete specification accepted and patent sealed May 24th, 1938.) (591130.)

J. Bell and C. S. Wright.—" Electrical distant control apparatus." 33039. December 2nd, 1936. (Complete specification accepted and patent sealed July 11th, 1938.) (591131.)

1938

J. Bell and C. S. Wright.—" Electric control systems." 32118. November 5th, 1938. (Complete specification accepted and patent sealed February 6th, 1940.) (591133.)

Belgian Railway Electrification

THE Belgian State Railway authorities are engaged on the preparation of plans for the electrification of about 937 miles of the system during the next five years as recommended in the recently-adopted report of the Belgian Commission Nationale d'Electrification. The electrification work is to be carried out mainly on the chief routes serving the traffic to and from Brussels; in the first instance operations will be undertaken on the line between Brussels and Charleroi, that between Linkebeek and Antwerp (North) and the line which passes round Brussels to give a connection between the Nord and Midi stations in that city. About 50 per cent of the electrification work is being centred on the principal double-track sections of the railway system which it is estimated carry 70 per cent of Belgium's rail traffic. The necessary power for the new electrified lines is to be supplied by privately-owned electricity generation undertakings and when the electrification work is fully completed it is estimated it will result in an annual saving of about 6½ million tons of coal. The complete electrification scheme is estimated to cost about £80 million.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Crayford.—September 8th. Urban District Council Fluorescent lighting in Town Hall offices. (August 22nd.)

Edinburgh.—September 6th. Corporation Electricity Department. Installation of electric lighting and power and call system in the Eastern General Hospital maternity block extension (spec. 523). Forms, etc., from the electrical engineer's office, Dewar Place.

North of Scotland Hydro-Electric Board. 132-kV transmission lines. (August 22nd.)

Keighley.—September 6th. Electricity Department. Transformers. (August 22nd.)

Middlesbrough.—September 19th. Electricity Department. Transformers, circuit breaker and oil break isolators and substation type distribution feeder panels. (August 15th.)

New Zealand.—October 31st. South Canterbury Power Board, Timaru. Peak-load control and metering gear, by superimposed ripple-frequency system or otherwise.

November 4th. Hydro-Electric Department. Turbines and generators for Cobb River power station (Contract 37) and electric travelling crane and motors (Contract 38). Tenders Committee, Wellington.

Plymouth.—September 5th. City Council. Electricians' wiring sundries for twelve months from October 1st. Particulars from the Stores officer, Stores Department, Mill Street.

Plympton St. Mary.—October 6th. R.D.C. Electricity Department. Underground cables, with pilot and telephone cable; switchboards and transformers. (See this issue.)

Portsmouth.—September 30th. Electricity Service. Transformers. (August 22nd.)

Sheffield.—September 2nd. Electricity Department. Transformers. (August 22nd.)

South Africa.—November 11th. Pretoria City Council. Piping and circulating water pumps and equipment for power station "B". (See this issue.)

Weymouth & Melcombe Regis.—September 27th. Electricity Department. Transformers. (August 22nd.)

Orders Placed

Brighton.—Corporation. Accepted. Two oil circuit breakers for the Islingword Road and Hartfield Road substations (£431).—Switchgear & Cowans.

Dartford.—Electricity Committee Recommended. Switchgear (£6,558).—A. Reyrolle & Co. Cables (£4,078).—Britannic Electric Cable & Construction Co. 500-kVA transformer.—Hackbridge & Hewittic Electric Co.

Deptford.—Borough Council. Accepted. Lighting fittings for New Cross Branch Library (£407).—Thorn Electrical Industries.

Glasgow.—Corporation. Accepted. Traction batteries (£16,476).—Tudor Accumulator Co.

Stockton-on-Tees.—Town Council. Accepted. Equipment for the Oxbridge and North Tees Trading Estate electric substations. Switchgear—A. Reyrolle & Co., Ltd. Switchboards—W. Lucy & Co. Transformers—C. A. Parsons & Co. Cable—Edison Swan Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Acton.—Houses (135), Great Western Garden Village estate; T. Alwyn Lloyd, 6, Cathedral Road, Cardiff.

Aylesbury.—Primary school, Oak Green (£65,888), for Bucks C.C.; Webster and Cannon, builders, Cambridge Street.

Bath.—Factory; Geo. Spencer Moulton & Co., Ltd., Kingston Mills, Bradford-on-Avon.

Bishop's Stortford.—Permanent aluminium bungalows (100) for employees of Stansted Aerodrome; U.D.C. surveyor.

Bootle.—Extensions to works, Turner & Gaffney, Ltd., Stanley Road; A. S. Atkinson, Martins Bank Buildings, Water Street, Liverpool.

Bromsgrove.—New Prince of Wales Cinema, Catshill, for A. Holloway; Hurley Robinson, architect, 6, Cherry Street, Birmingham.

Cardiff.—Factory, Ty-glas Road, Opticell Ltd.; Sir Percy Thomas & Son, 14, Cathedral Road.

Factory, Penarth Road, Stone & Co., Ltd.; Yorke, Rosenberg & Marshall, 35, Welbeck Street, W.1.

Caterham.—Seven blocks of maisonettes, Whiteley Court; C. P. Butcher & Co., Ltd., builders, 83, Ebury Street, S.W.1.

Colindale.—Factory for Elliotts (Windscreens), Ltd., Kingsbury Road, N.W.9.

Chatham.—Accommodation for urses at County Hospital (£21,000); Kent county architect, Springfield, Maidstone.

Chelmsford.—Extensions to works, Walter Jamieson Ltd., Cottage Place; Chamberlain & Willows, 23, Moorgate, E.C.2.

Cheshunt.—Houses (110), Bury Green estate (£133,657), for U.D.C.; Cheshunt Builders, Ltd.

Cricklewood. — Rebuilding war-destroyed factory of Kenrosa Ltd., 152, Clarence Road, Clapton; Shaw & Lloyd, 74, Great Russell Street, W.C.1.

Croydon.—Primary schools, Spring Park (£98,600); borough architect.

Darlington.—Educational development scheme including 20 new schools for the E.C. (£1,500,000); borough architect.

Additions to sewage disposal works for the T.C. (£30,000); direct labour.

Dewsbury.—Rebuilding Westfield Mills; W. Crabtree & Sons Ltd., blanket manufacturers.

Durham.—Adaptation of nursery block at Durham Institution as maternity unit; county architect, Court Lane.

Houses (110) on the Sunderland Road estate for the City Council; H. F. Mole, builder, Chester-le-Street.

Elgin.—Houses (52), Seafield Lands, Bishopmill; J. P. M. Wright, architect to T.C., 82, High Street.

Ellesmere Port.—Houses (62); U.D.C. surveyor, C.D. Headquarters, Queen Street.

Enfield.—Laboratory; Brimsdown Chemical Works Ltd., Mill Marsh Lane, Brimsdown.

Extensions to Cyldon Works, Gt. Cambridge Road; F. Boreham, Son & Wallace, Victoria House, Southampton Row, W.C.1.

Great Yarmouth.—Hotel, "rollerdrome," etc., near Lowestoft Road, Gorleston; Gorleston Holiday Camp, Ltd.

Hammersmith.—Extensions to works Silexine Ltd., Richford Street; W. S. Grice, 123, Victoria Street, S.W.1.

Hartlepool.—Maternity ward at Hartlepools Hospital, Friar Street; Turnbull & Rowe, architects, 6, Scarborough Street, West Hartlepool.

Hull.—Rebuilding Bankside Works; J. L. Seaton & Co., Ltd., oil manufacturers.

Lancing.—Primary school, Old Salts Farm Road; F. R. Steele, county architect, County Hall, Chichester.

Leadgate (Co. Durham).—Houses (36) for Consett U.D.C.; J. J. Eltringham, Derwent Street, Blackhill, Co. Durham.

Manchester.—Canteen at works, for Joshua Hoyle Ltd., Piccadilly; T. Hayes, 10, Clegg Street, Oldham.

Extensions to works, Gaythorn, for Dunlop Rubber Co., Ltd.; architects' department, Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham 24.

Middleton-in-Teesdale (Co. Durham).—Houses (34) for Barnard Castle R.D.C.; F. Blenkinsopp, surveyor, R.D.C. Offices, Barnard Castle.

Neath.—Factory for G. L. Harrow Ltd., 51, Margaret Street, W.1; J. Arnold & Smith, Western Chambers.

Park Royal.—Training school and factory for Royal London Society for Teaching and Training the Blind, Minerva Road; F. R. Jelley, 15, Uplands Road, Sutton, Surrey.

Preston.—Extensions, Red Scar Mills, Ribbleton; Courtaulds Ltd., Lockhurst Lane, Coventry.

Rainham.—Factory, New Road, L. S. Masters Ltd., Green Lane, Goodmayes; Edward Meredith, Victoria House, High Road, Goodmayes.

Reading.—Extensions to works, Ark Food Products, Ltd., King's Road; Sainsbury & Chamberlain, Cross Street.

Rutherglen. — Additions to Rutherglen Academy; William Watt, county education architect, County Offices, Motherwell.

Salterbeck. — Factory for Cumbrian Tools Ltd.; Sir Alexander Gibb & Partners, Queen Anne's Lodge, S.W.1.

Sheppey (Kent).—Extensions and alterations to County Hospital (£39,000); county architect, Springfield, Maidstone.

Skelton-in-Cleveland. — Factories at new Trading Estate, for North-eastern Trading Estates Ltd.; Needham & Thorp, 6, High Petergate, York.

Stourport.—Factory, Kidderminster Road, Boucher & Co., Ltd., Mill Street; Gethings & Rolley, Kingsley Hall.

Sunderland.—Alterations to the Children's Hospital, and vicarage on the Springwell Farm estate; S. W. Milburn & Partners, architects, 52, Fawcett Street.

Furniture factory for M. Davis & Son, Ltd., 174, High Street East, Sunderland; S. W. Milburn & Partners, architects, 52, Fawcett Street.

Factory additions for John Lynn & Co., Ltd., engineers and ironfounders, Pallion, Sunderland; Company's own architects.

Houses (44) at Castletown and 18 at New Herrington for the R.D.C.; direct labour.

Thornaby-on-Tees.—Factory additions for W. & M. Pumphrey, Ltd., sugar refiners (£7,500); N. Thompson, Ltd., builders, Stonehouse Street, Middlesbrough.

Usworth (Co. Durham).—Conversion of old school into a clothing factory for Pawsons, Ltd., Halifax; Hetherington & Wilson, County Chambers, Westgate Road, Newcastle-on-Tyne.

Walsall.—Factory for Beacon Tools, Ltd., Croxtalls Road, Bloxwich.

Extensions to factory for S. F. Proffitt & Co., Ltd., St. Annes Road.

Warrington.—High school for girls, Louchers Lane, for E.C. (£235,397); J. Y. Hughes, borough surveyor, Municipal Buildings.

Weardale.—Foundry, Stanhope site; G. Blair & Co. Ltd., Great North Road, Newcastle-on-Tyne.

West Hartlepool.—Bakery, Powlett Road, for Hartlepools Co-operative Society, Stockton Street, West Hartlepool (£60,000).